

# Spills & Overfills

NCDEQ – Waste Management  
Underground Storage Tank Section

## Spill / Overfill

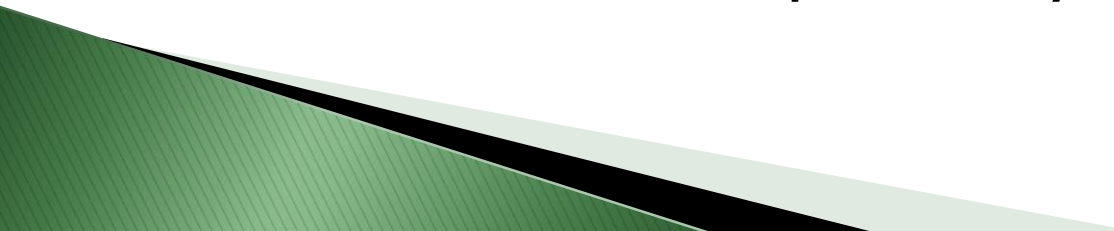


9/1/2016

# Spill and Overfill Prevention

to eliminate the potential for a release of product during fuel deliveries

## Four Topics in this section

- Spill Prevention
  - Overfill Prevention
  - also
  - Vapor Recovery
  - Product Compatibility
- 

# What's the difference?

## ▶ **Spill prevention:**

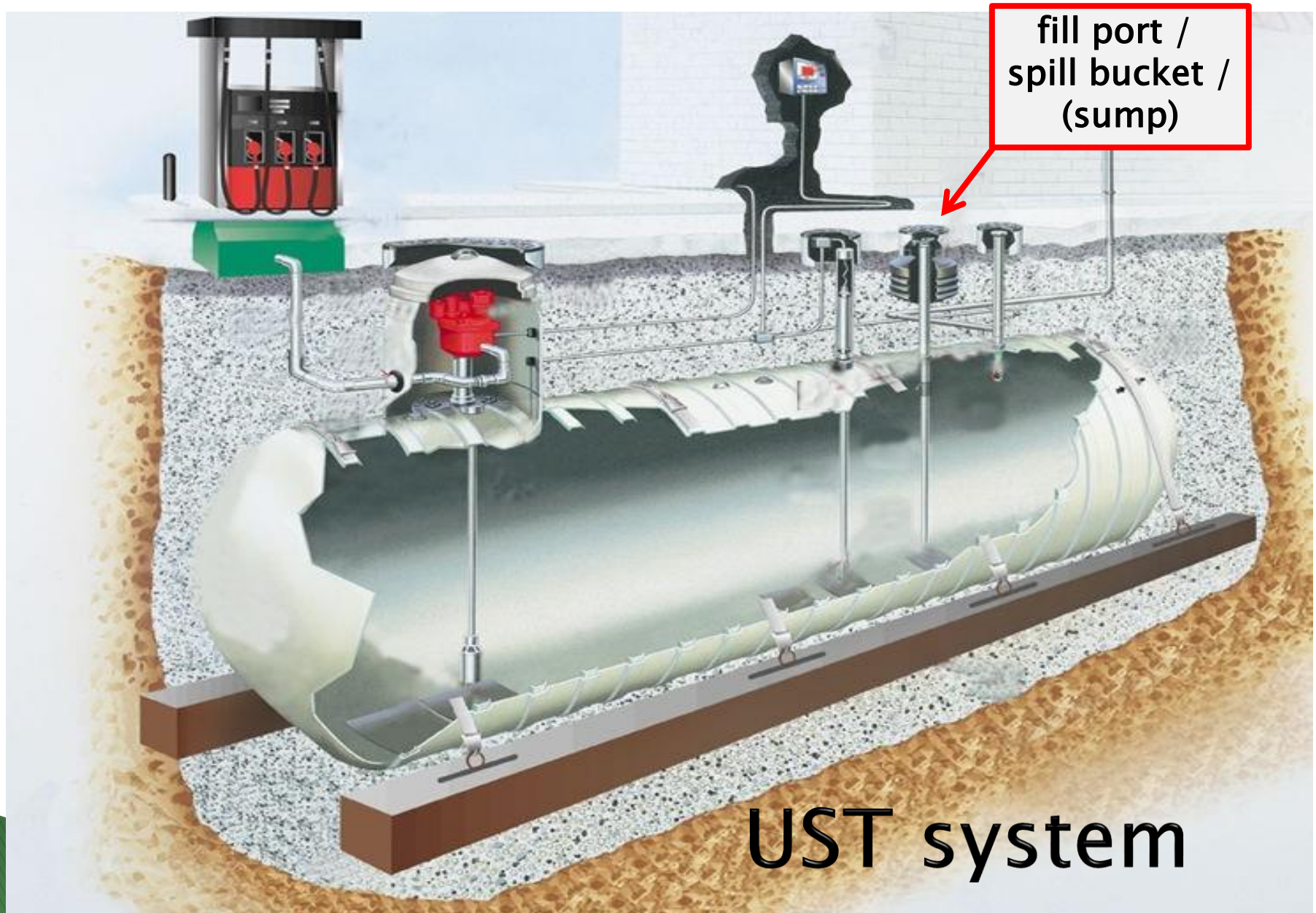
- Contains drips and spills of fuel that occur when delivery hose is uncoupled from fill port

## ▶ **Overfill prevention:**

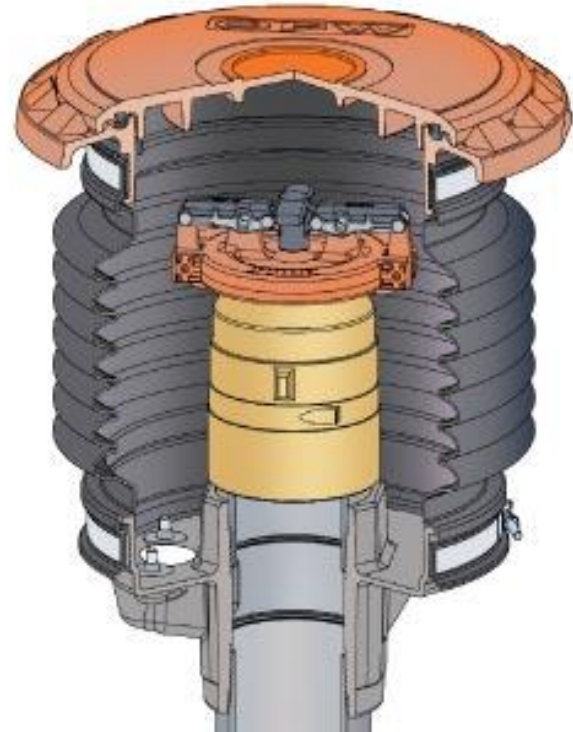
- Provides transporter with indication that tank is approaching full during delivery



## Spill / Overfill



## Spill / Overfill





## Spill / Overfill





Spill / Overfill





# #6 on checklist

Spill prevention

Local Fill

**Is spill prevention operating properly?**

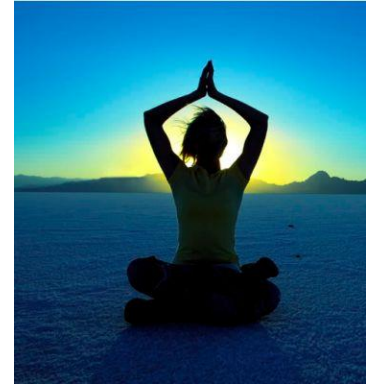
# Fill ports must have spill buckets



- ▶ temporarily contains spilled fuel
- ▶ NOT designed to hold fuel longterm
- ▶ typically 5 – 25 gallon capacity
- ▶ must be empty, clean, undamaged



## Spill / Overfill



Garbage, water,  
or fuel takes up  
space designed  
for a spill

# Installations after Nov 1,2007

**Secondary Containment required on**

- ✓ Tanks
- ✓ Piping
- ✓ Spill buckets

➤ **meaning: Double walled**





# Spill buckets installed after Nov 1, 2007 ?

## SPILL PREVENTION

Has DWM been notified of spill methods?

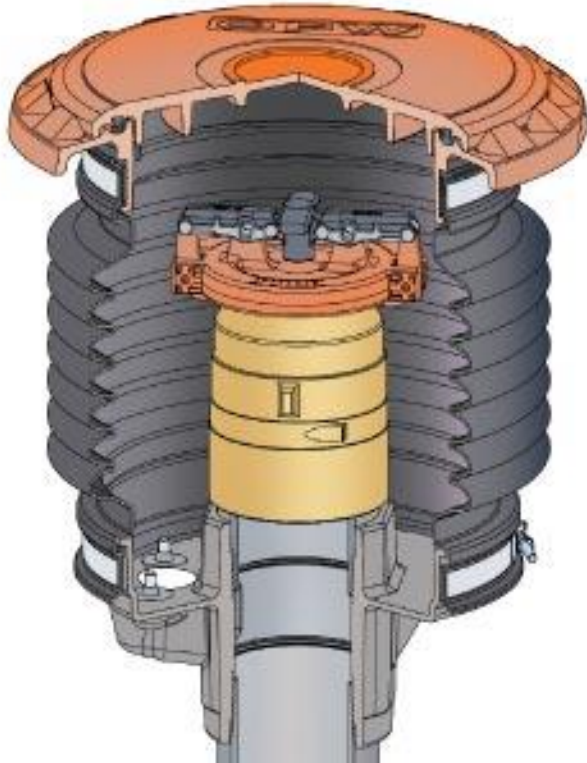
Spill/Overfill Details	Tank #1(A1A)	Tank #2(A1B)	Tank #3(A1C)	Tank #4(4)
Is a drop tube present?				
Type of Stage I vapor recovery?				

Local Fill	Tank #1(A1A)	Tank #2(A1B)	Tank #3(A1C)	Tank #4(4)
Does Tank have a Remote Fill?				
Is spill prevention equipment provided and verified?				
Spill bucket is double-walled? (If installed after 11/1/07)				
Spill bucket is isolated or made of non-corroding materials? (If installed after 11/1/07)				
Date spill prevention provided				
Is spill prevention operating properly?				
If No, select all that apply				
If other, describe				

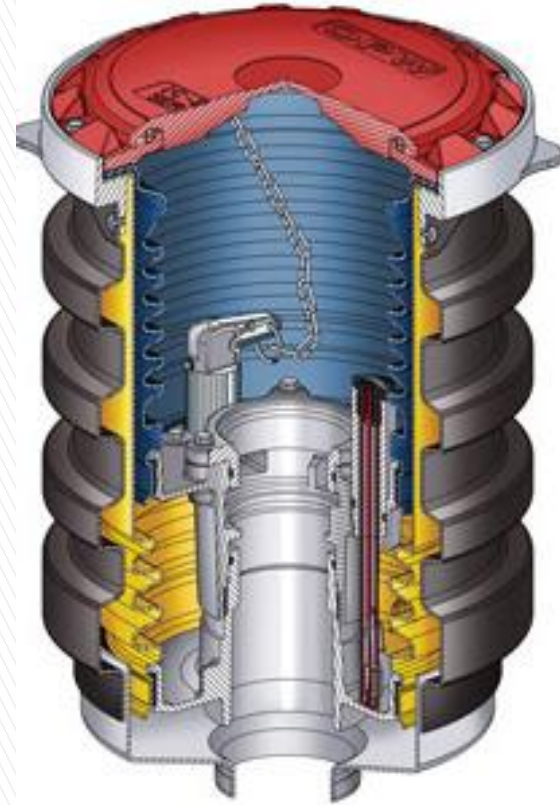


6

# Spill bucket (sump)



Single walled

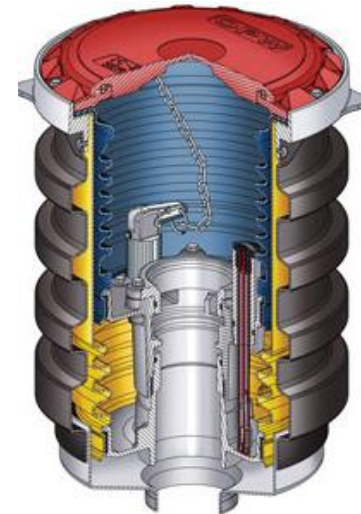


Double walled



# Installed after 11 / 1 / 07

- ▶ NEW spill buckets are double-walled
- ▶ Electronic sensor monitors interstice
- ▶ Sensor wired to computer/console/printer



# Installed after 11/1/07

## REQUIREMENT:

- ▶ 2 printouts per month for each spill bucket sensor
- ▶ keep 12 months of printouts

JUN 17, 2008 10:34 AM

SMART SENSOR STATUS

JUN 17, 2008 10:34 AM

s 1:87 T-1 INT SEN  
SENSOR NORMAL

\* \* \* \* \* END \* \* \* \* \*

ALARM HISTORY REPORT

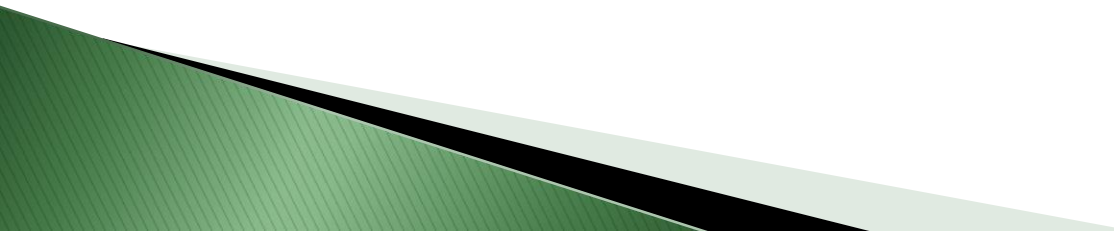
--- SMARTSENSOR ALARM ---  
s 1:87 T-1 INT SEN  
SETUP DATA WARNING  
JUN 6, 2008 9:43 AM

VACUUM WARNING  
MAY 21, 2008 1:06 PM

NO VACUUM ALARM  
MAY 21, 2008 11:07 AM

# Installed after 11/1/07

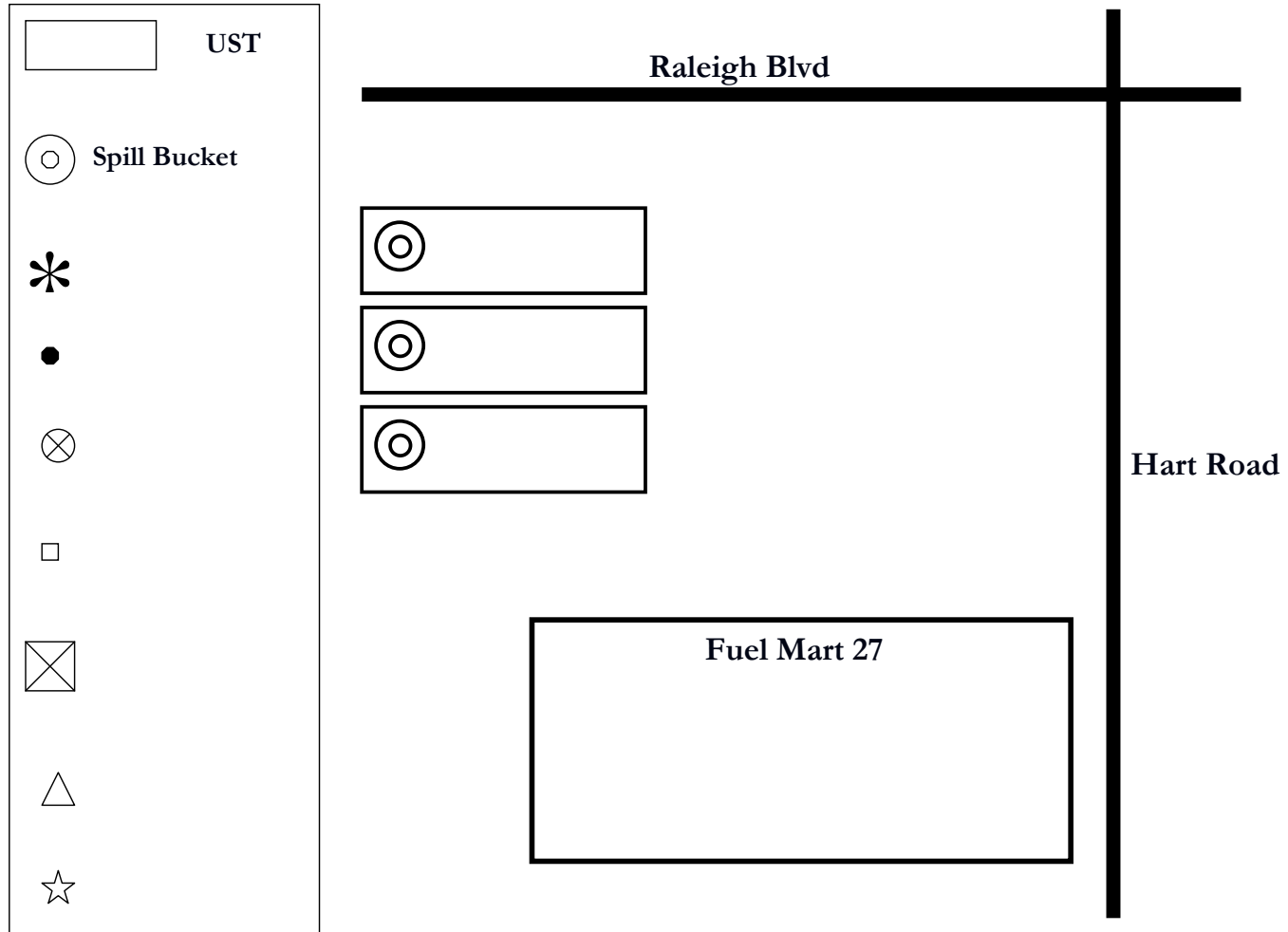
## REQUIREMENT

- **UST-22B form every year**  
check bucket sensor
  - **UST-23A form every 3 years**  
check bucket tightness
- 



# UST Site Diagram

UST Site Diagram for: Fuel Mart 27



# #7 on checklist

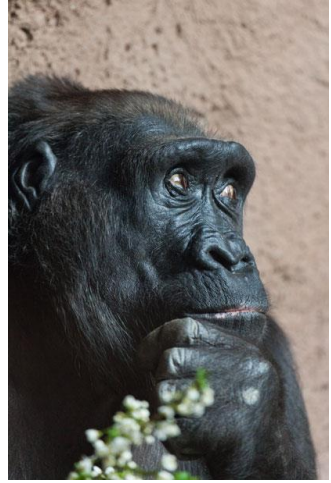
Overfill Prevention

Overfill Control

Type of overfill equipment

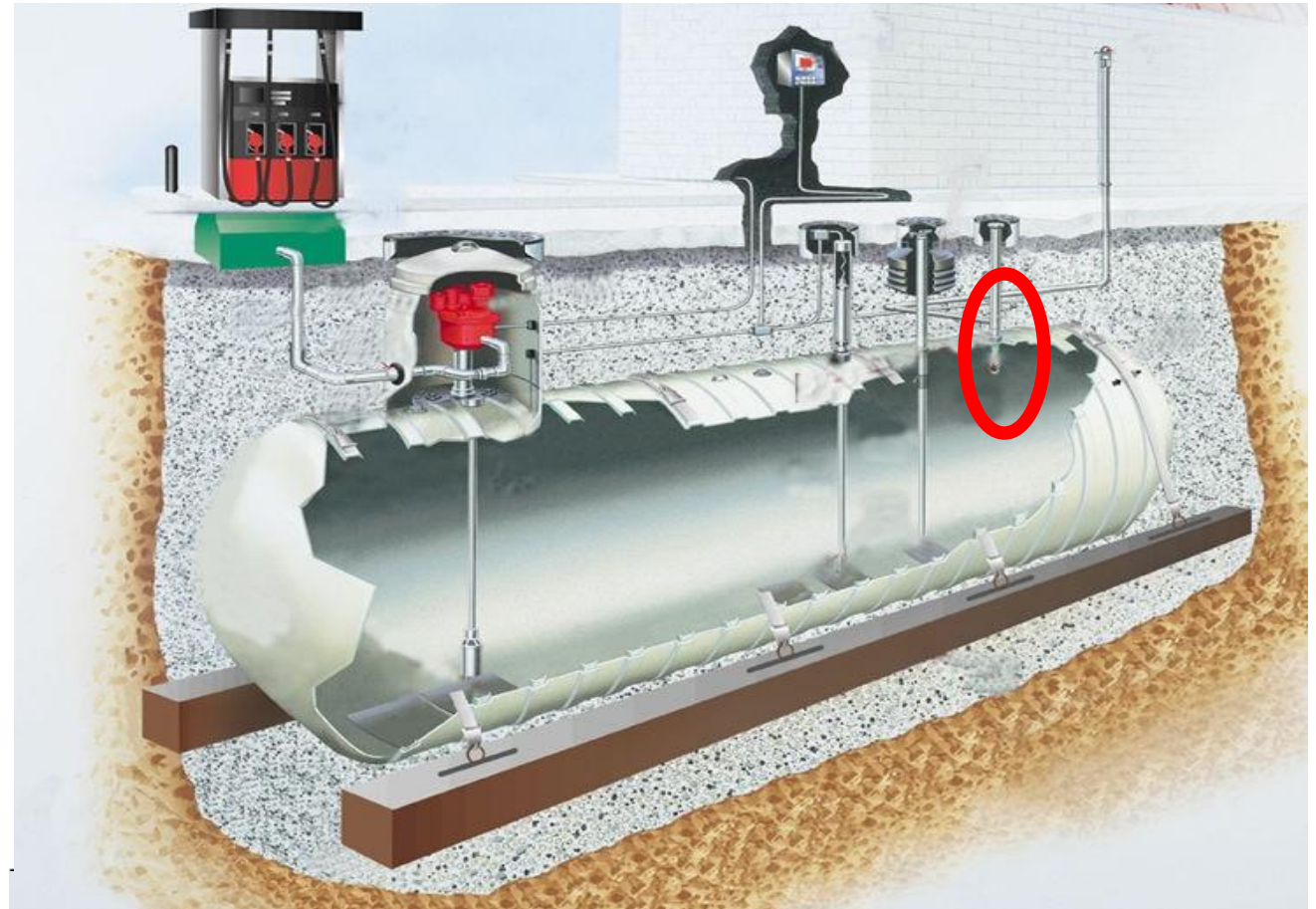
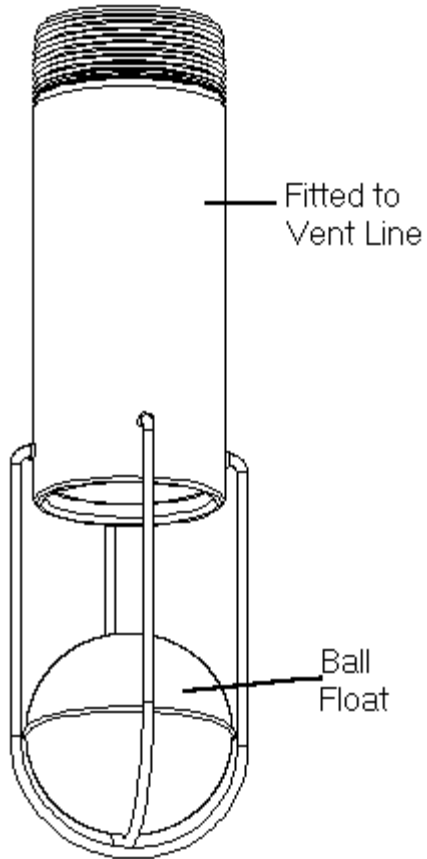
# Overfill prevention equipment

- ▶ Ball float
- ▶ High level alarm
- ▶ Auto shutoff device / flapper





# Ball Float



# Spill / Overfill



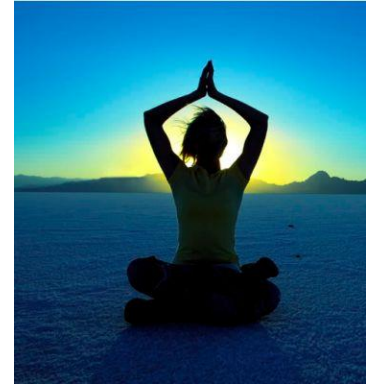
9/1/2016

# Ball float valves

- ▶ Reduces flow of delivery
- ▶ Does NOT STOP it
- ▶ Slows fuel delivery at 90% capacity or 30 min before overfilling



# Ball float valves



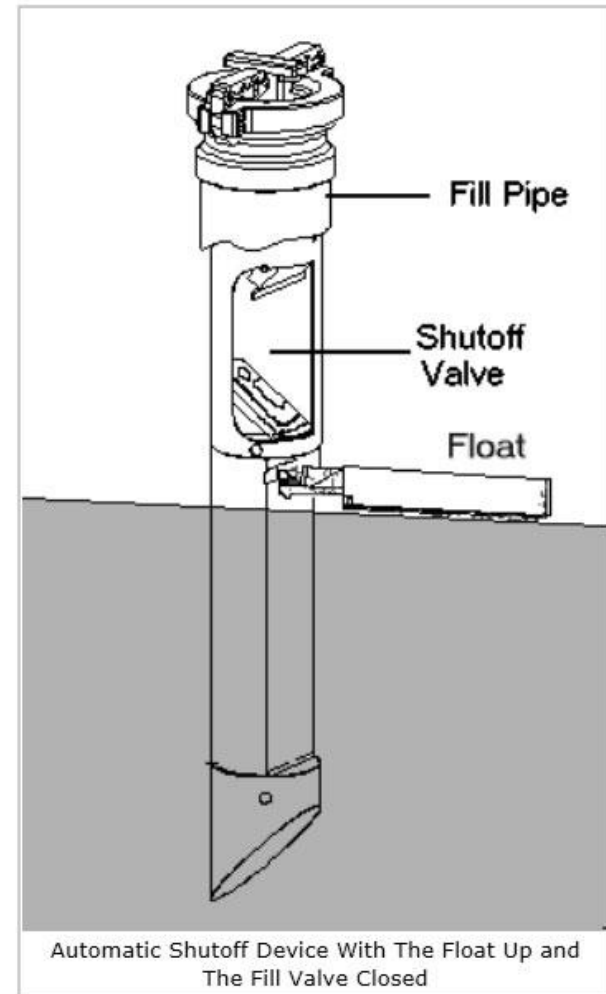
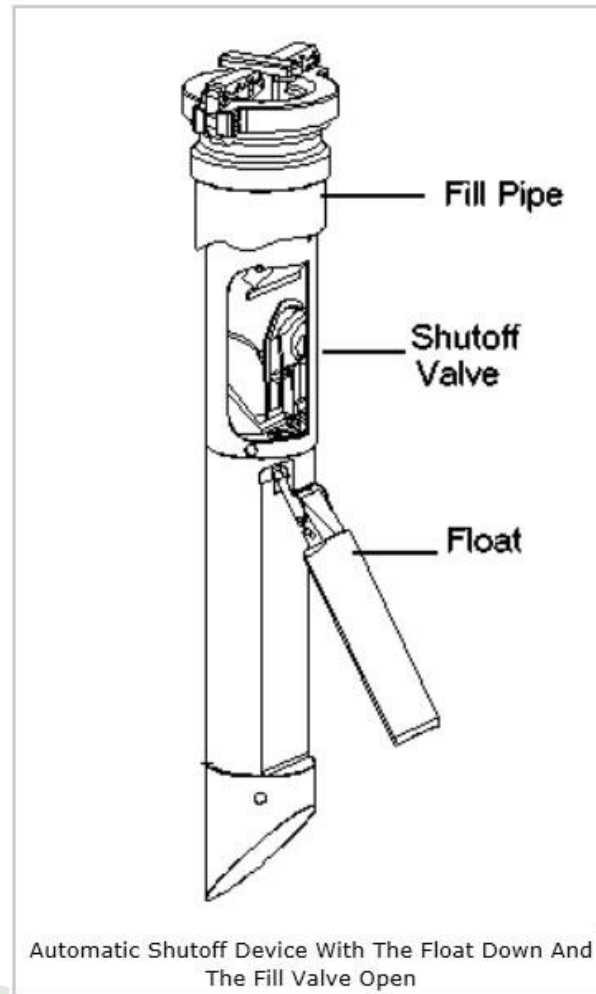
- ▶ ONLY verified with a PICTURE or WRITTEN verification
  
- ▶ NOT compatible with:
  - Pressurized fuel delivery
  - Suction piping
  - Coaxial vapor recovery

# High Level Alarm

- ▶ Does NOT reduce or stop fuel delivery
- ▶ Audible and/or visual warning at 90% capacity
- ▶ Must be located where it can be seen / heard from delivery site (outdoors)



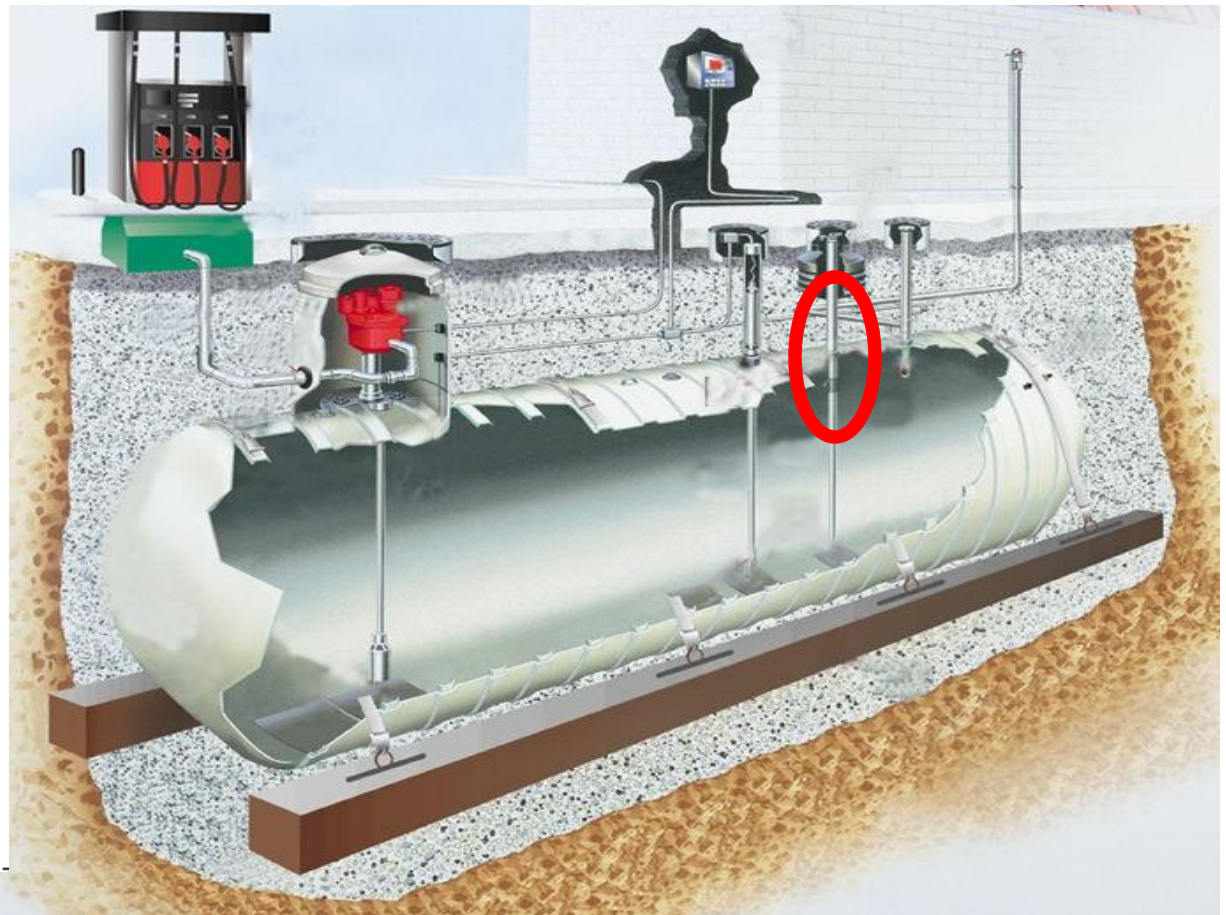
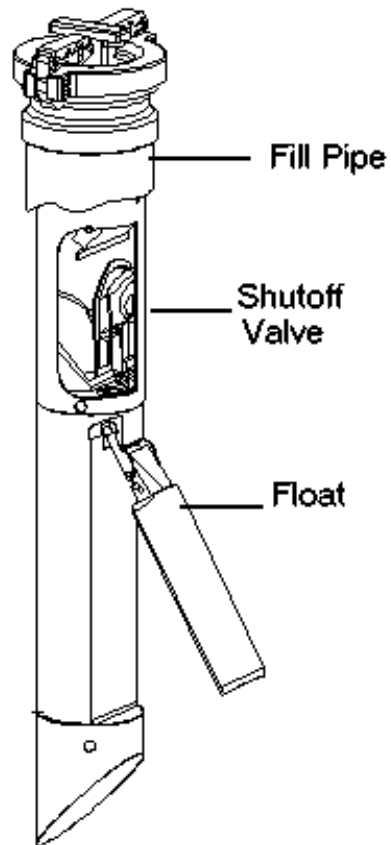
# Flapper valve / Auto-shutoff device



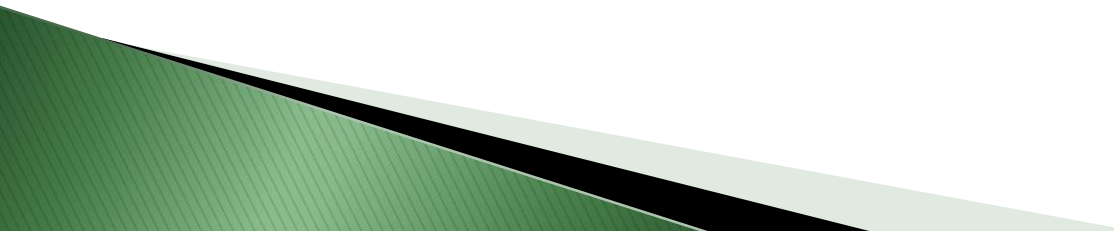


Spill / Overfill

# Flapper valve / Auto-shutoff device



## Flapper valve / Auto-shutoff device

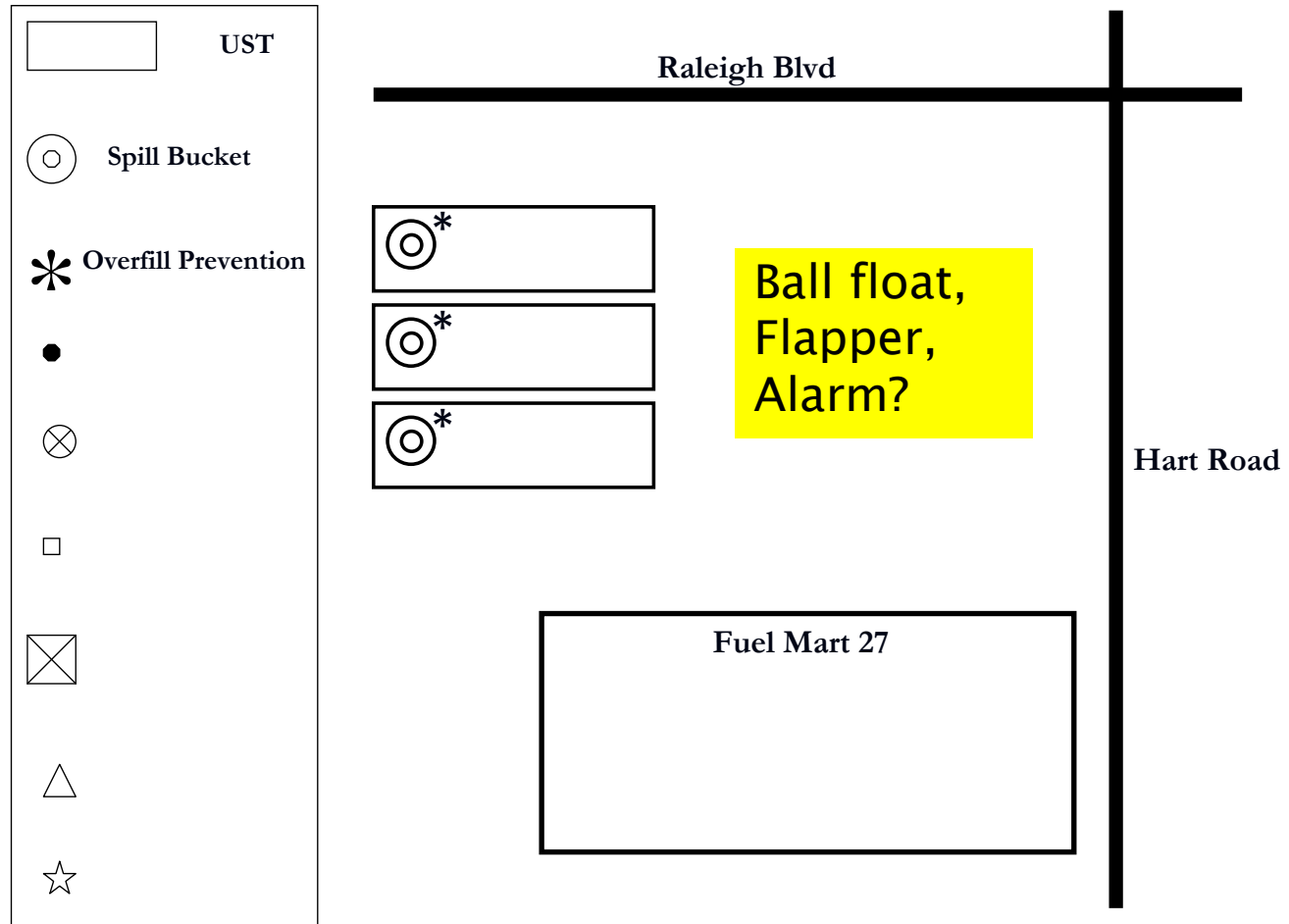
- Stops fuel delivery **into** the tank, BUT not out of the truck
  - Stops delivery at 95% capacity
  - Usually verified visually (fill port)
- 

# Flapper valve / Auto-shutoff device



# UST Site Diagram

UST Site Diagram for: Fuel Mart 27





# Your overfill responsibilities

- ▶ Ensure amount of fuel ordered will fit
- ▶ Monitor the fuel delivery
  - Have spill response supplies ready
- ▶ Use signs and notify delivery person of overfill device

# Overfill installed after 11/1/07

## OVERFILL PREVENTION

Has DWM been notified of overfill methods?

Overfill Control	Tank #1(A1A)	Tank #2(A1B)	Tank #3(A1C)
Is overfill prevention equipment provided and verified?			
Date overfill control provided			
Type of overfill equipment			
Source of information for overfill control verification			
If other, describe			
Is overfill control operating properly?			
If No, select all that apply			
If other, describe			
Annual overfill check date			



7



# Overfill installed after 11/1/07

Additional test required

**UST-22A form every year**

check for operation/damage

# #5 on checklist

Spill prevention

Spill/Overfill Details

**Type of Stage 1 vapor recovery?**



# Vapor Recovery

- ▶ Vapor takes up space, like air
- ▶ Fuel into tank means vapor comes out of tank
- ▶ Kerosene and Diesel vapor recovery not required
- ▶ Division of Air Quality regulates this but we check that you have the equipment

# Vapor Recovery

Two types:

1. Coaxial
2. Dual Point

Inspector checks if it is:

- Present
- Operational

NOT required for Diesel or Kerosene

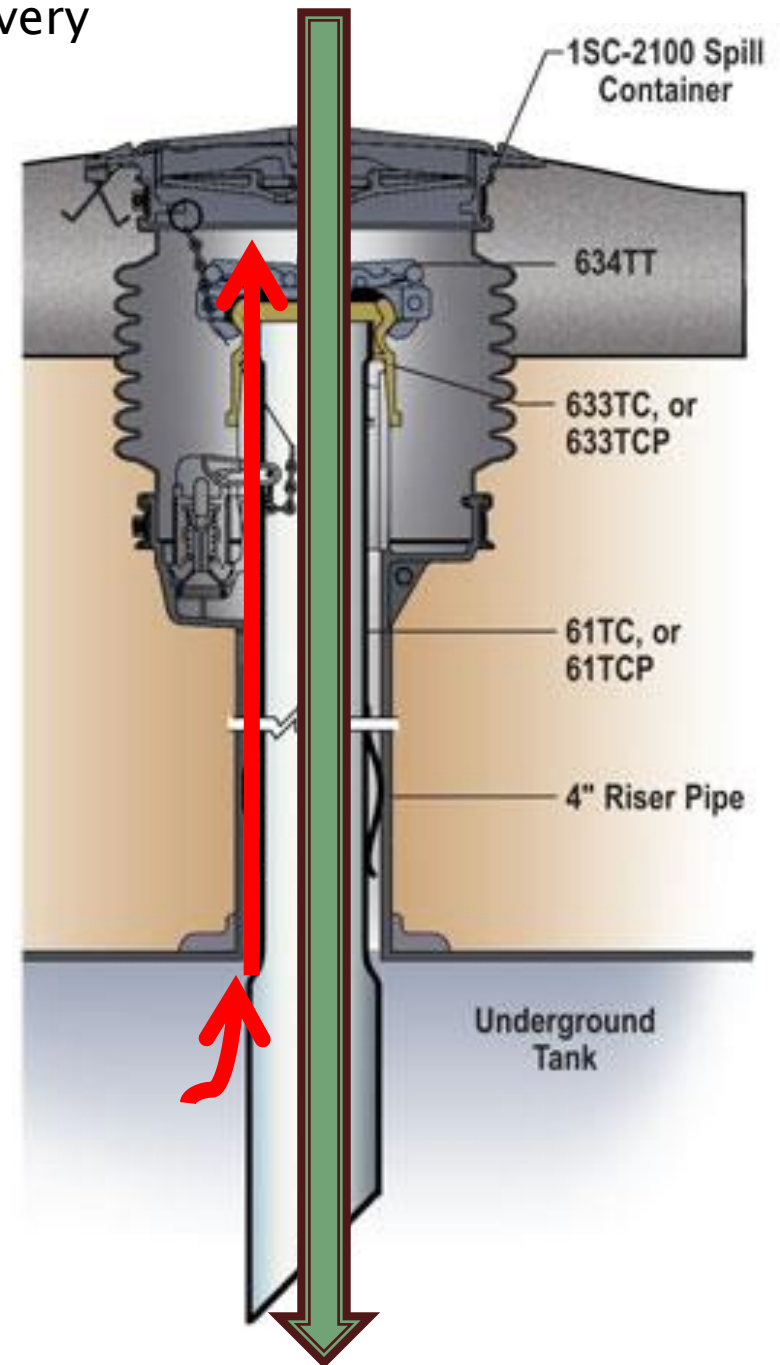
# Coaxial:

Inside  
fill port  
in spill  
bucket



# Coaxial:

Fill tube is inside  
larger vapor  
recovery tube





# Dual Point:

- In its own sump.
- Remove pipe cap.
- Spring loaded valve inside

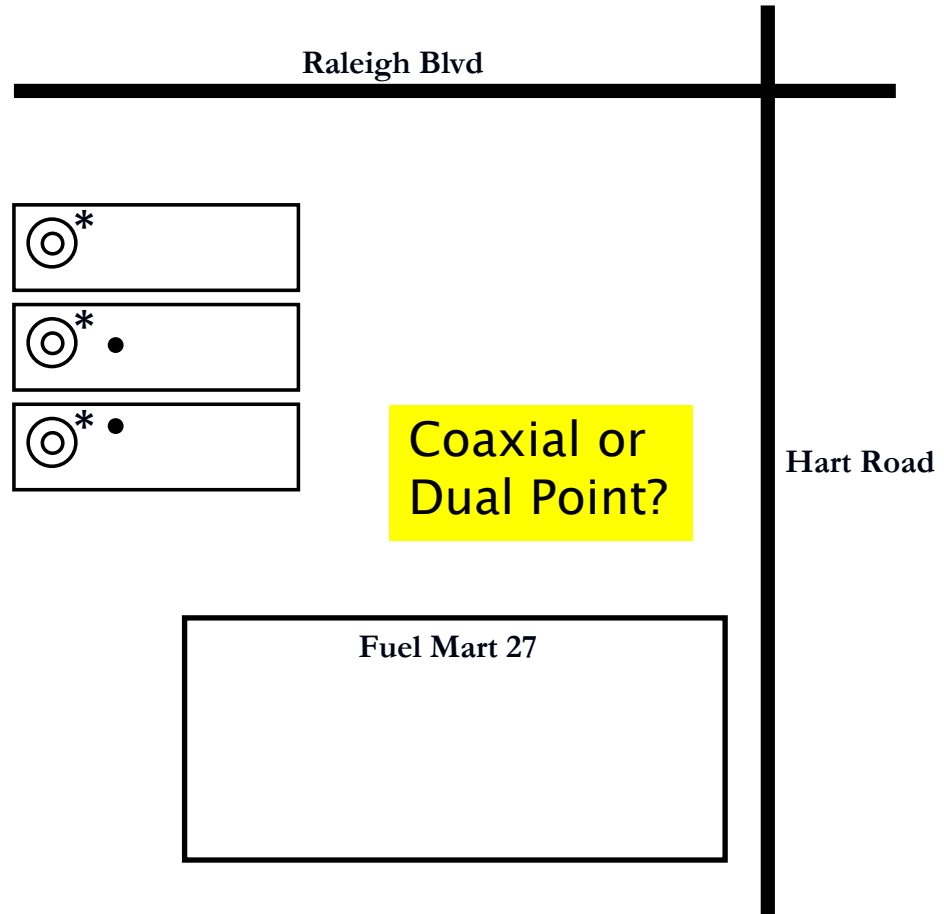
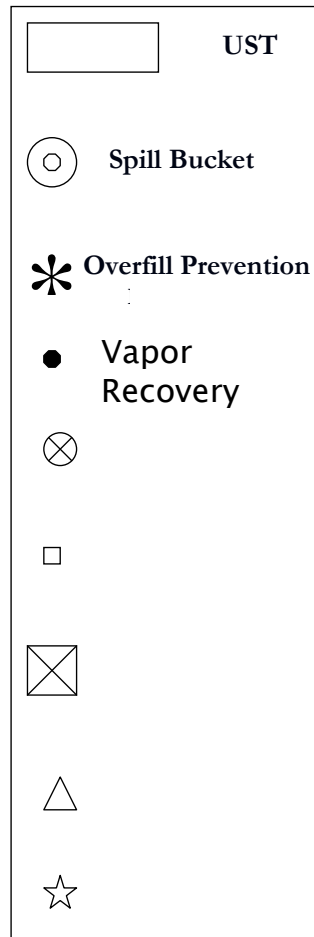


# Dual Point: manifold



# UST Site Diagram

UST Site Diagram for: Fuel Mart 27





# Common Alternative Fuels

## Same rules apply for

- traditional gasoline
- E10=10% ethanol/90% gas
- B20= 20% biodiesel/80% diesel



## Extra Requirements

Anything over:

- 10% ethanol
- 20% biodiesel



## Extra requirement = UST 20 Form

- ▶ Submit PRIOR to storing fuel that is:
  - >10% ethanol, or
  - >20% biodiesel
- ▶ UST 20 completed by UST owner/operator and equipment contractor or PE
- ▶ Include
  - Documents verifying compatibility OR
  - Compatibility analysis by PE



## Spill / Overfill



9/1/2016

# Example of Accelerated Corrosion



Standard, non-E85 fuel



E85

Same facility – Same install date

*Photos courtesy Iowa DNR*

# Corrosion Protection: Tanks

NCDENR  
Division of Waste Management  
Underground Storage Tank Section



# Tank Corrosion Protection

Protecting the **integrity** of the UST walls





# Tank Corrosion Protection:

## A. Non-corrodible materials

FRP (fiberglass reinforced plastic),  
composite, jacketed, clad

## B. Internal Lining

## C. Sacrificial Anodes

## D. Impressed Current



# #1 on checklist

## Corrosion Protection

### Tank Corrosion Protection

#### CP Method 1

- FRP/ DWFRP/ Jacketed/ Clad (Non-corrodible materials)
- Internal Lining
- Sacrificial Anodes
- Impressed Current



# 1. Non-corrodible Materials UST

## ► FRP

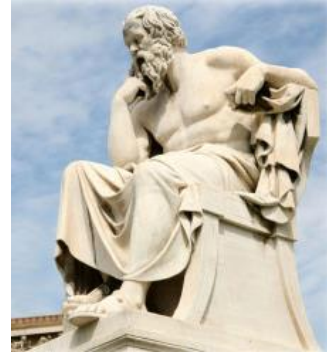
(Fiberglass Reinforced Plastic)

## ► DW FRP

(Double-Walled)



# Non-corrodible Materials UST



- ▶ Steel/FRP Composite
- ▶ Jacketed/Clad



# Non-corrodible Material Records:

- ▶ **Written verification of tank material:**
  - Installation or repair **invoice**
  - Original **UST-8 form** signed by installer at time of installation
  - Verifiable **photographs** of installation
  
- ▶ **Visual verification:**
  - Not typical for tanks

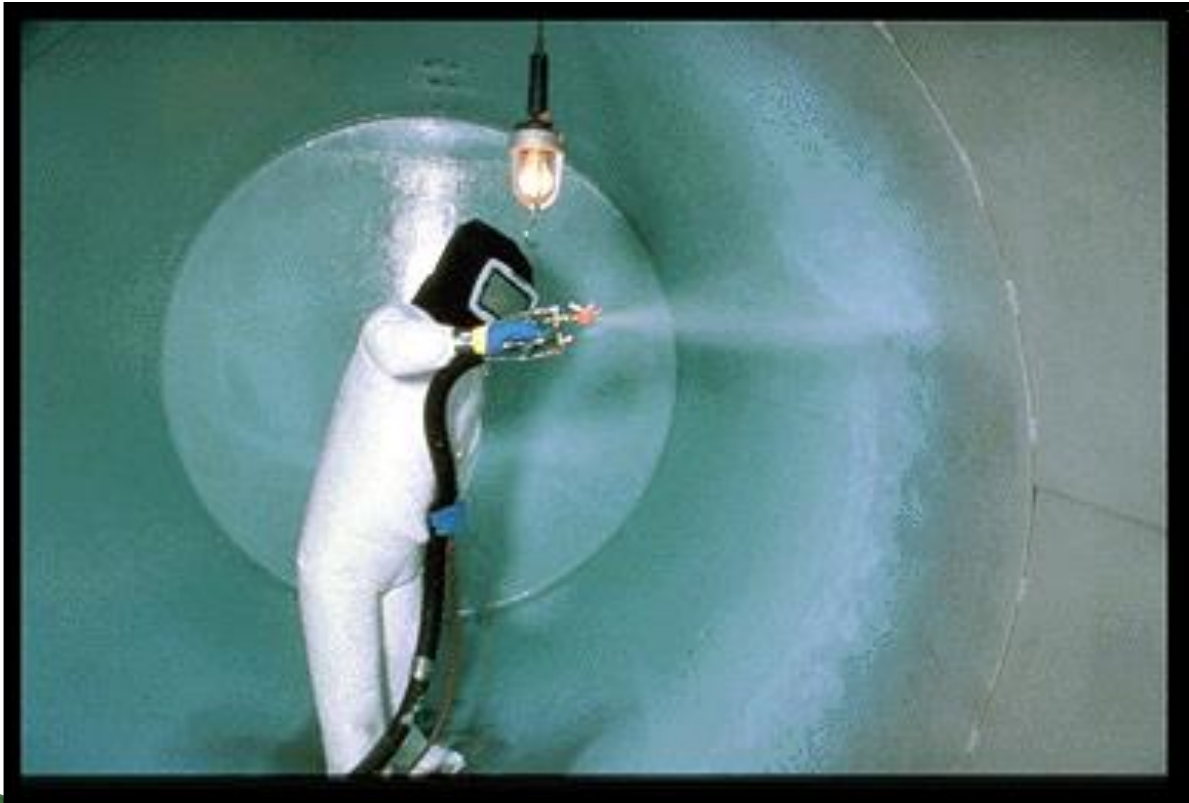
**Corrosion protection testing NOT required**

# Tank Corrosion Protection

Tank Corrosion Protection <b>1</b>	Tank Leak Detection	Piping Corrosion Protection			Piping Leak Detection – (circle one)  Suction / Pressurized / Both		
Method <b>FRP</b>	Method	Method	Method	Method	Method (circle one)  European  American/ Standard	Method (circle one)  ELLD  MLLD	Method (circle one)  LTT SIR ELLD IM
Testing Frequency  <b>N/A</b>	Testing Frequency	Testing Frequency	Testing Frequency	Testing Frequency	Testing Frequency	Testing Frequency	Testing Frequency
Documentation <b>Install Invoice/ UST 8 / photograph</b>	Documentation	Documentation	Documentation	Documentation	Documentation	Documentation	Documentation
<b>N/A</b>	Next date	Next date	Next date	Next date	Next date	Next date	Next date



## 2. Internal Lining



- ▶ Applying *non-corrodible lining* inside UST

# Internal Lining Testing:

- ▶ Internal inspection within 10 years of installation,
- ▶ Then every 5 years thereafter
- ▶ Tightness test after every internal inspection

# Internal Lining Records:

- ▶ Most recent **internal inspection** results
- ▶ Most recent **tightness test** results
- ▶ Keep repair *invoices*
- ▶ **National code or standard** used for installation

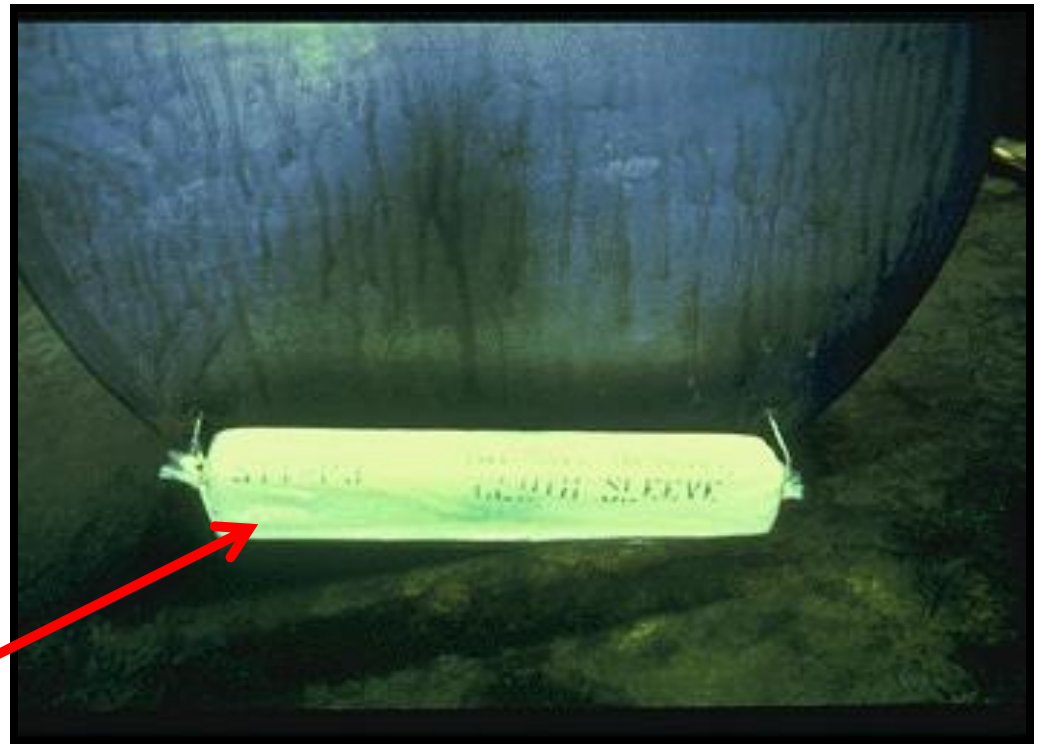
# Tank Corrosion Protection

Tank Corrosion Protection <b>1</b>	Tank Leak Detection	Piping Corrosion Protection			Piping Leak Detection – (circle one)		
					Suction / Pressurized / Both		
Method	Method	Method	Method	Method	Method (circle one)	Method (circle one)	Method (circle one)
<b>Internal Lining</b>  <b>p. 11</b>					European	ELLD	LTT
					American/ Standard	MLLD	SIR ELLD IM
Testing Frequency	Testing Frequency	Testing Frequency	Testing Frequency	Testing Frequency	Testing Frequency	Testing Frequency	Testing Frequency
<b>10 yrs</b> <b>5 yrs</b>							
Documentation	Documentation	Documentation	Documentation	Documentation	Documentation	Documentation	Documentation
<b>Internal Inspection Results</b> <b>TTT results</b>							
Next date / -- / Next date	Next date	Next date	Next date	Next date	Next date	Next date	Next date

### 3. Sacrificial Anode UST

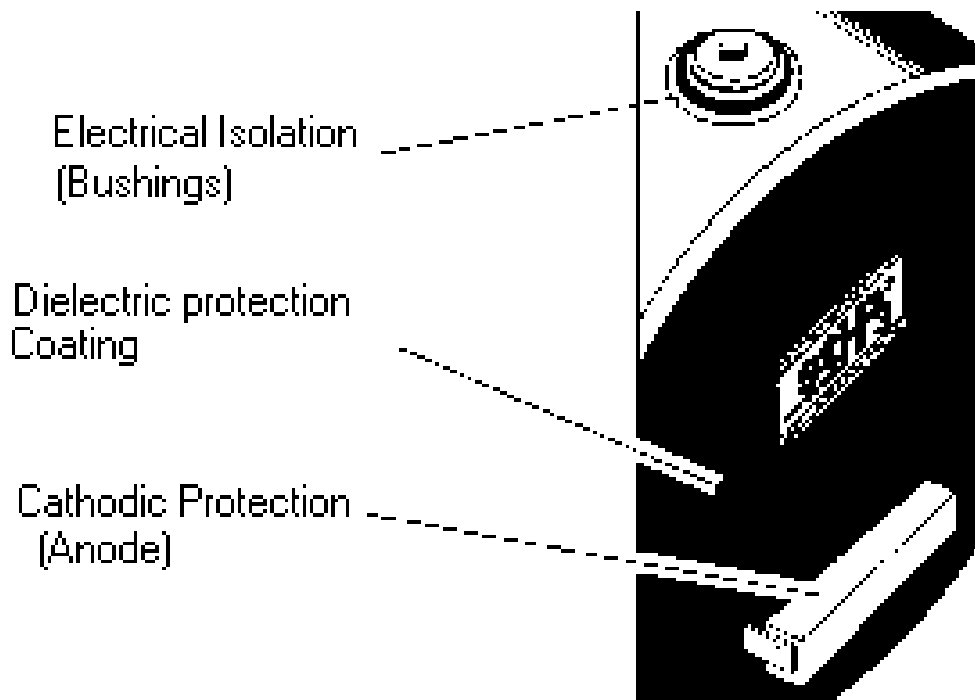
- ▶ **Anodes**  
(*zinc* or *magnesium*)  
connected to  
structure by  
welding or  
lead wires

Anode





# Sacrificial Anode UST:



- ▶ **Anode corrodes, instead of UST**



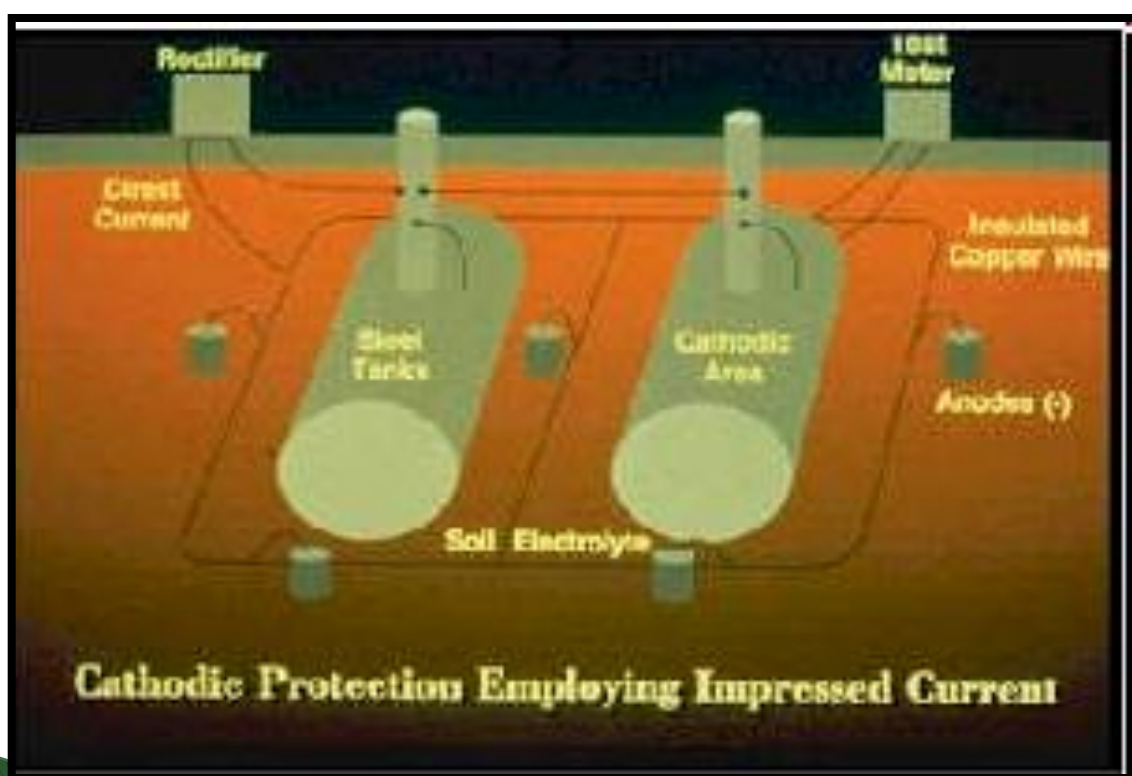
# Sacrificial Anode UST

- ▶ Test every 3 years
- ▶ Done by *qualified* cathodic protection tester
- ▶ Report results on UST-7A form
- ▶ Keep the (2) most recent tests

# Tank Corrosion Protection

Tank Corrosion Protection <b>1</b>	Tank Leak Detection	Piping Corrosion Protection			Piping Leak Detection – (circle one)		
					Suction / Pressurized / Both		
Method	Method	Tank end	Main Run	Dispenser end	Suction	Pressurized	Pressurized
Sacrificial Anodes p. 12		Method	Method	Method	Method (circle one)	Method (circle one)	Method (circle one)
					European	ELLD	LTT
					American/ Standard	MLLD	SIR ELLD IM
Testing Frequency	Testing Frequency	Testing Frequency	Testing Frequency	Testing Frequency	Testing Frequency	Testing Frequency	Testing Frequency
3 yrs							
Documentation	Documentation	Documentation	Documentation	Documentation	Documentation	Documentation	Documentation
7A							
Next date	Next date	Next date	Next date	Next date	Next date	Next date	Next date
9/1/2016	---/---/---						

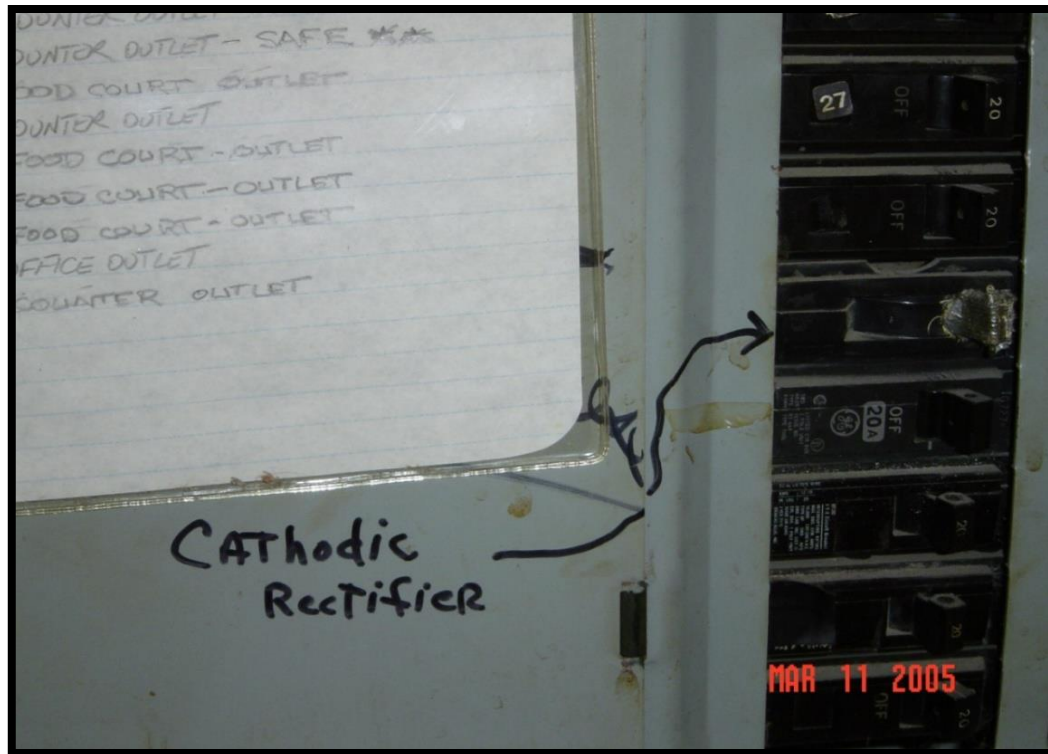
## 4. Impressed Current Systems



- ▶ Anodes located in soil around structures to be protected
- ▶ *Electrical current* is applied to anodes



# Impressed Current Requirements:



- Requires **dedicated** and **protected** circuit
- **Power** must not be interrupted
- **Breaks** in wiring result in system failure

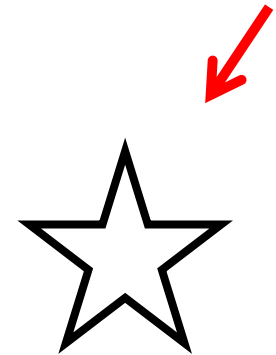
# Impressed Current Requirements:



Rectifier Box

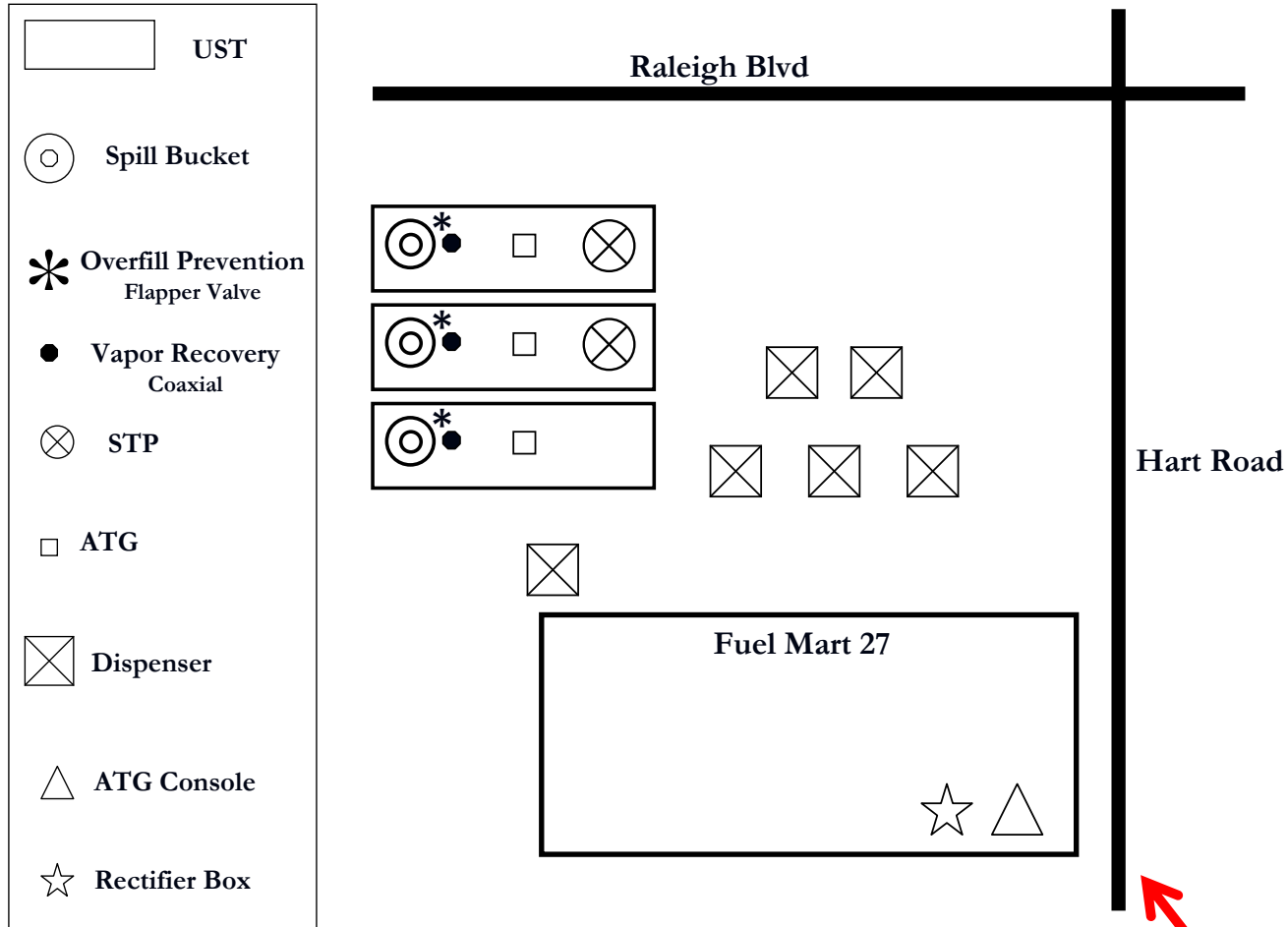
- Operator must inspect system **every 60 days**
- Record reading on UST-21 form
- If reads **ZERO** , Call testing company
- If changes by **> 20%**, Call testing company
- Make sure meter never loses **power**

# Add Rectifier Box to Site Diagram



# UST Site Diagram:

UST Site Diagram for: Fuel Mart 27






# Impressed Current Records

- Test IC system every 3 years
- Done by qualified *cathodic protection tester*
- Report results on UST-7B form



UST-7B		NORTH CAROLINA CATHODIC PROTECTION SYSTEM EVALUATION FOR IMPRESSED CURRENT SYSTEMS			
<p>➤ This form must be utilized to evaluate underground storage tank (UST) cathodic protection systems in the State of North Carolina.</p> <p>➤ A copy of this completed form must be submitted by the owner /operator to the NCDENR UST Section, at the address listed below, within 30 days of testing.</p> <p>➤ Access to the soil directly over the cathodically protected structure that is being evaluated must be provided.</p> <p>➤ A site drawing depicting the UST cathodic protection system and all reference electrode placements must be completed.</p>					
I. UST OWNER			II. UST FACILITY		
Name:			Name:		Facility ID:
Address:			Address:		
City:		State:	City:		County:
III. REASON SURVEY WAS CONDUCTED (mark only one)					
<input type="checkbox"/> Routine – 3 year <input type="checkbox"/> Routine – within 6 months of installation <input type="checkbox"/> Re-survey as soon as the cathodic protection system reaches steady-state polarization design standards after repair/modification (complete					



# Tank Corrosion Protection

Tank Corrosion Protection <b>1</b>	Tank Leak Detection	Piping Corrosion Protection			Piping Leak Detection – (circle one)		
					Suction / Pressurized / Both		
Method	Method	Tank end Method	Main Run Method	Dispenser end Method	Suction Method (circle one)  European  American/ Standard	Pressurized Method (circle one)  ELLD  MLLD	Pressurized Method (circle one)  LTT SIR ELLD IM
Testing Frequency	Testing Frequency	Testing Frequency	Testing Frequency	Testing Frequency	Testing Frequency	Testing Frequency	Testing Frequency
Documentation	Documentation	Documentation	Documentation	Documentation	Documentation	Documentation	Documentation
--- / --- / --- Next date --- / --- / ---	Next date	Next date	Next date	Next date	Next date	Next date	Next date

**Impressed  
Current  
p. 12**

**60 days  
3 yrs**

**Rectifier  
readings  
7B**

9/1/2016

# Problems with Cathodic Protection (Sacrificial Anodes or Impressed Current)

# Problems with Impressed Current:



**Broken  
Wires**

# Problems with Impressed Current:



**No  
power**

# Problems with Cathodic Protection

If rectifier, impressed current, or sacrificial anode  
**test FAILS or there has been NO ELECTRICITY**

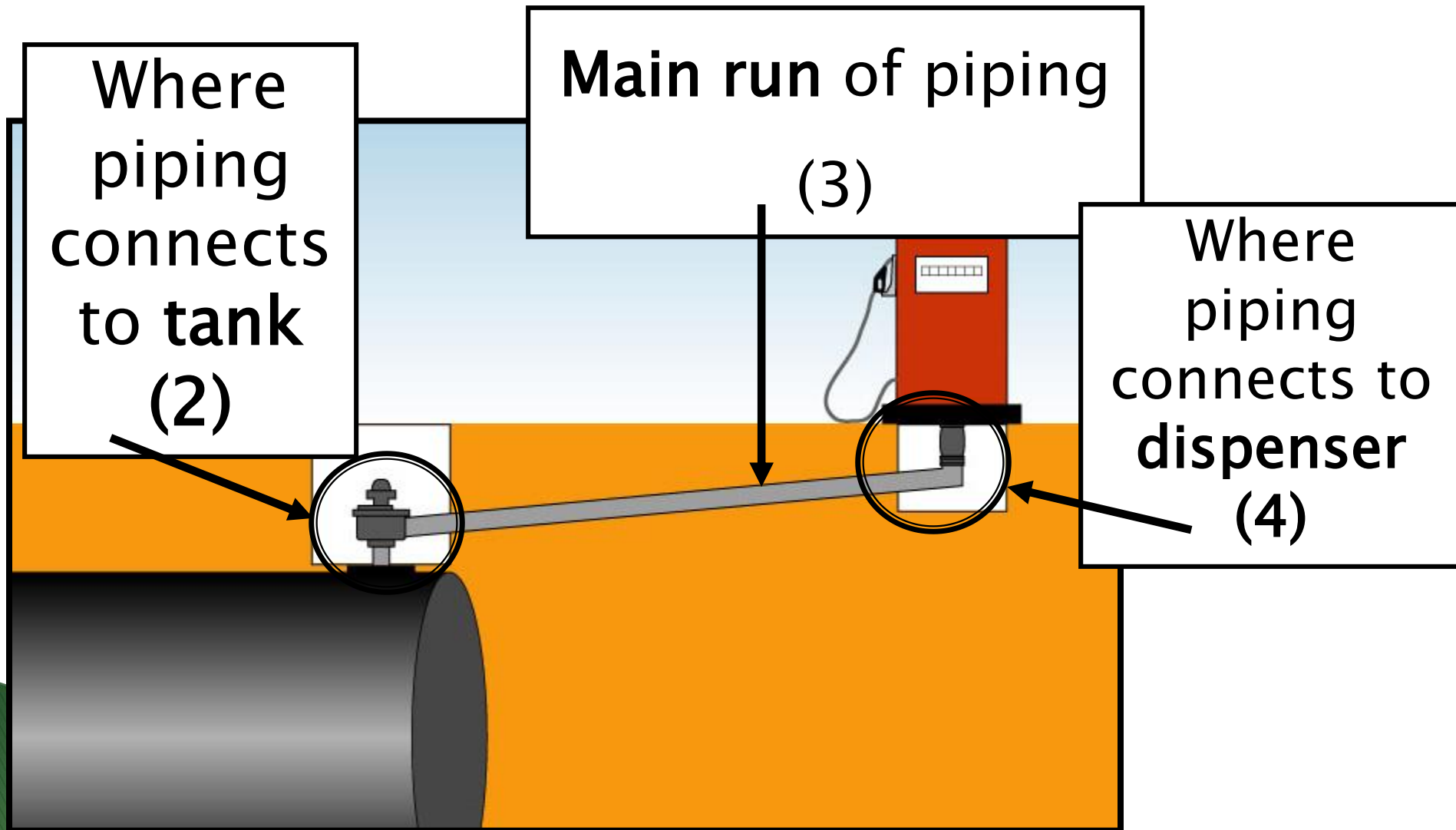
See corrosion protection guidance documents  
on website



# UST Piping – Corrosion Protection

NCDENR  
Division of Waste Management  
Underground Storage Tank Section

# Piping Corrosion Protection





**Pump Sump over tank**



# Pump Sump over tank allows you to



- Verify piping material
- Verify isolation of metal components
- Check it is clean and dry



# Pump Sump over tank

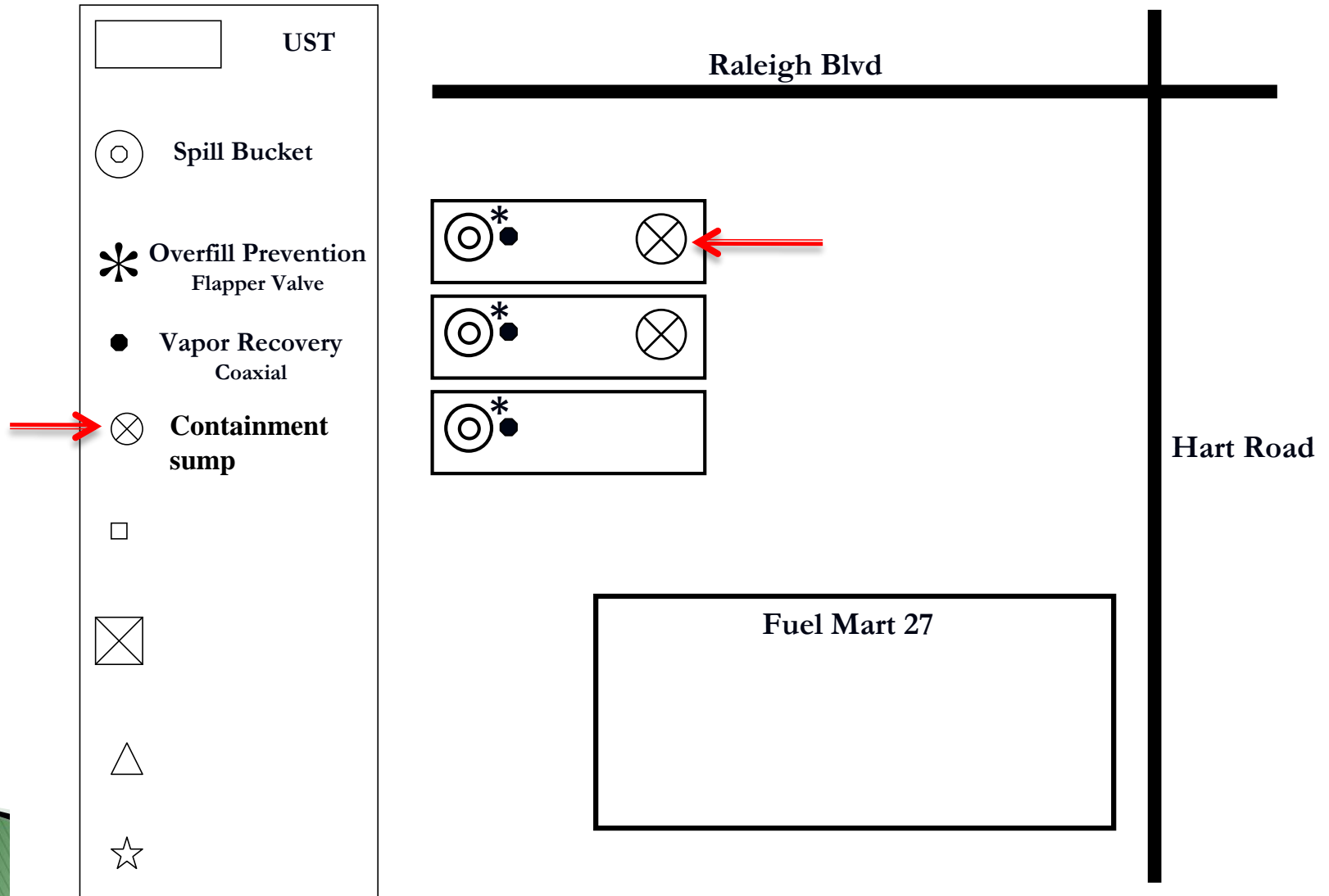




# UST Site Diagram:

UST Site Diagram for: \_\_\_\_\_

Fuel Mart 27



# #2, #3, #4 on checklist

## CORROSION PROTECTION

### **Tank Corrosion Protection**

2 – Corrosion Protection Method  
(for piping at tank)

### **Pipe Corrosion Protection**

3 – CP Method  
(along the main run of piping)

### **Dispenser Corrosion Protection**

4 – Corrosion Protection Method  
(at the dispenser)

# Corrosion protection options on 10 B

- Isolated, Booted
- FLEX, FRP, DW FLEX, DW FRP
- Sacrificial Anodes (SA)
- Impressed Current (IC)
- N/A (generator tank ?)
- Unknown (violation?)

- **Isolated,  
Booted**
- **FLEX, DW FLEX  
FRP, DW FRP**
- **Sacrificial  
Anodes (SA)**
- **Impressed  
Current (IC)**
- **N/A (generator  
tank)**
- **Unknown –  
violation?**

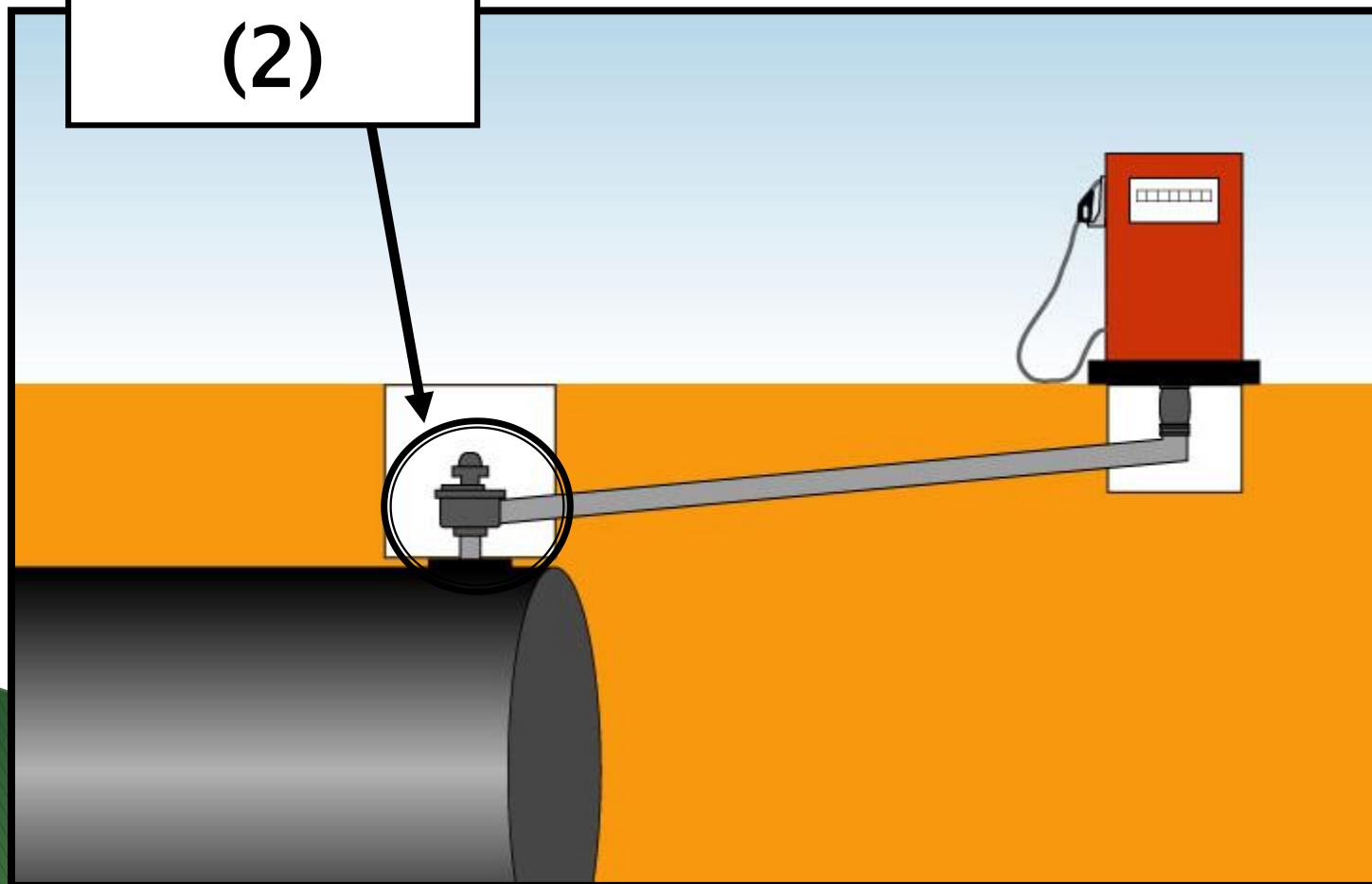
UST System Compliance Plan

	Tank Leak Detection	Piping Corrosion Protection			
		2 Tank end	3 Main Run	4 Dispenser end	
Method	Method	Method	Method	Method	Method
Testing Frequency	Testing Frequency	Testing Frequency	Testing Frequency	Testing Frequency	Testing Frequency
Documentation	Documentation	Documentation	Documentation	Documentation	Documentation
Next date	Next date	Next date	Next date	Next date	Next date



Where  
piping  
connects  
to tank  
(2)

Isolated





# Isolated



**Metal  
isolated  
inside  
sump**

# Isolated



**Metal  
isolated  
inside  
sump**



# Isolated



Metal  
isolated  
inside  
sump



# Booted

- ▶ Piping is booted
- ▶ If buried (not visible) must verify in writing



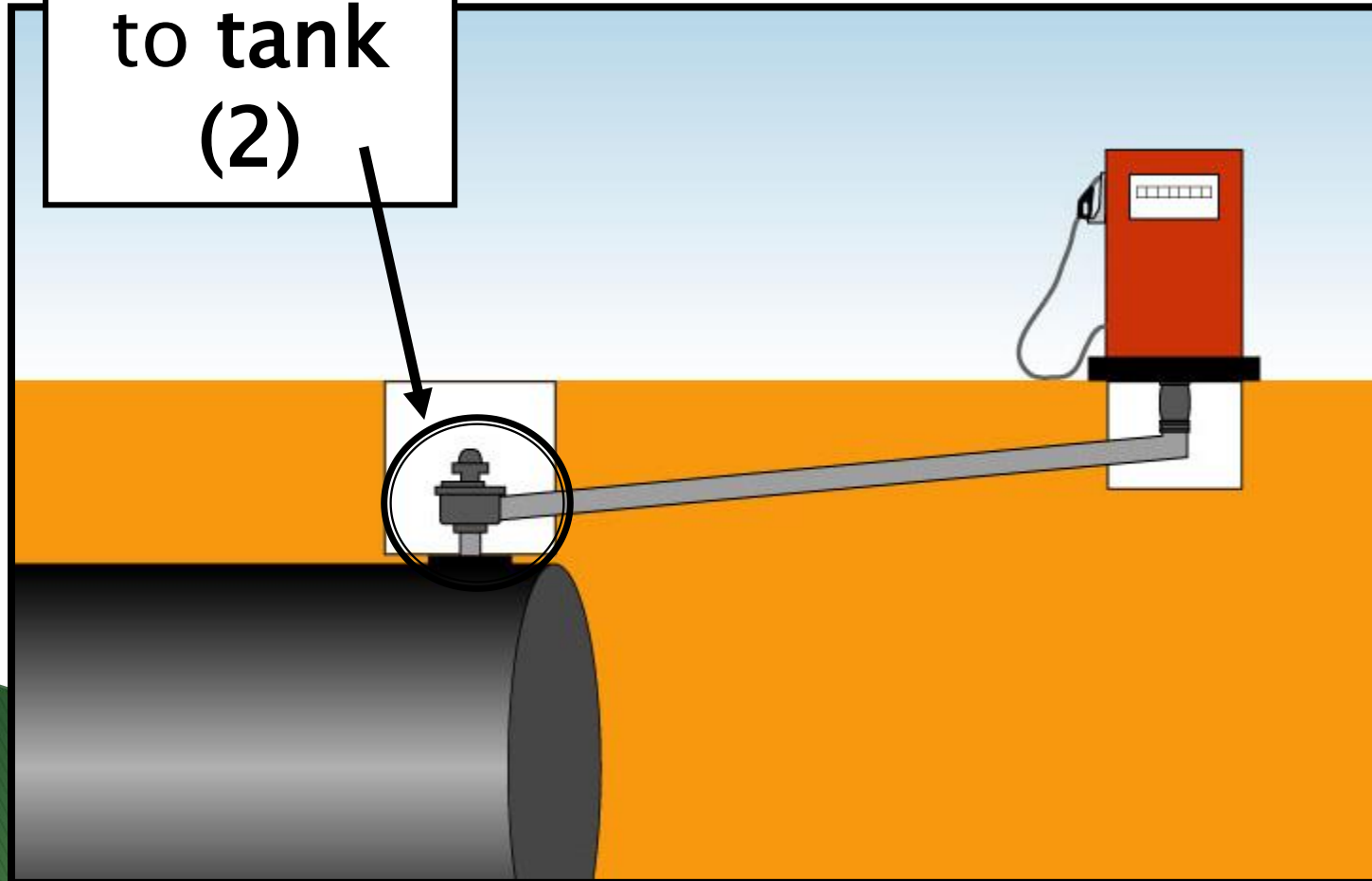
# Piping Corrosion Protection

Tank Corrosion Protection	Tank Leak Detection	Piping Corrosion Protection			Piping Leak Detection – (circle one)		
		2	3	4	Suction / Pressurized / Both		
		Tank end	Main Run	Dispenser end	Suction	Pressurized	Pressurized
Method	Method	Method <b>Isolated/ Booted</b>  <b>p. 14</b>	Method	Method	Method (circle one)  European  American/ Standard	Method (circle one)  ELLD  MLLD	Method (circle one)  LTT SIR ELLD IM
Testing Frequency	Testing Frequency	Testing Frequency  <b>N/A</b>	Testing Frequency	Testing Frequency	Testing Frequency	Testing Frequency	Testing Frequency
Documentation	Documentation	Documentation <b>Visual/ Invoice/ Contractor report</b>	Documentation	Documentation	Documentation	Documentation	Documentation
Next date	Next date	Next date <b>N/A</b>	Next date	Next date	Next date	Next date	Next date



# Sacrificial Anodes

Where  
piping  
connects  
to tank  
(2)



# SACRIFICIAL ANODES

- ▶ **Anode corrodes instead of piping component**




# Sacrificial Anodes:


- ▶ **Anodes**  
connected via  
wires to metal  
piping



# Sacrificial Anodes:

- ▶ Test every 3 years
- ▶ Hire a qualified *cathodic protection tester*
- ▶ Report results on UST-7A form
- ▶ Form is at <http://portal.ncdenr.org/web/wm/ust/forms>



UST-7A		NORTH CAROLINA CATHODIC PROTECTION SYSTEM EVALUATION FOR GALVANIC (SACRIFICIAL ANODE) SYSTEMS			
<p>▶ This form must be utilized to evaluate underground storage tank (UST) cathodic protection systems in the State of North Carolina.</p> <p>▶ A copy of this completed form must be submitted by the owner/operator to the NCDENR UST Section, at the address listed below, within 30 days of testing.</p> <p>▶ Access to the soil directly over the cathodically protected structure that is being evaluated must be provided.</p> <p>▶ A site drawing depicting the UST cathodic protection system and all reference electrode placements must be completed.</p>					
I. UST OWNER			II. UST FACILITY		
Name:			Name:		Facility ID:

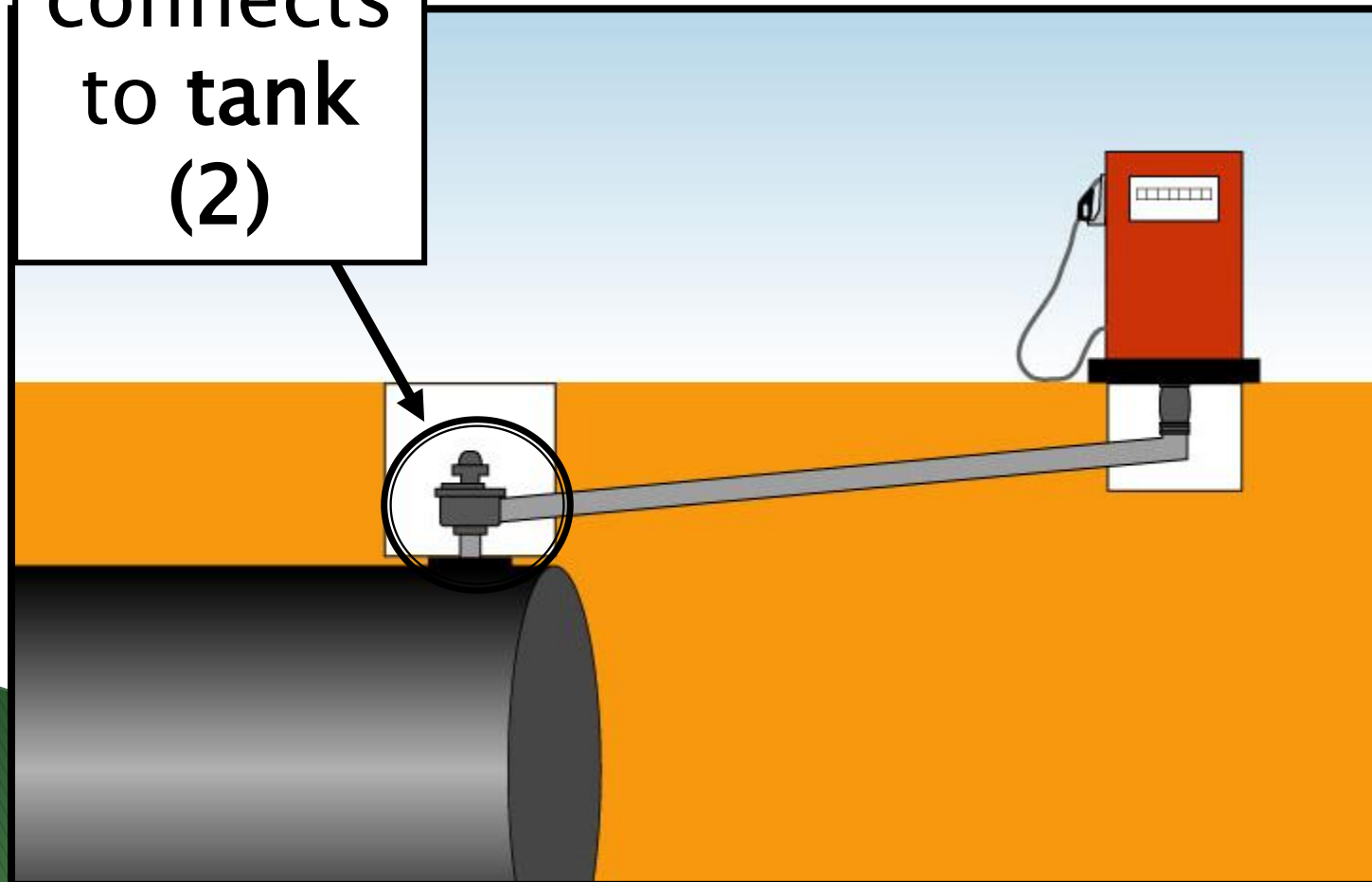


# Piping Corrosion Protection

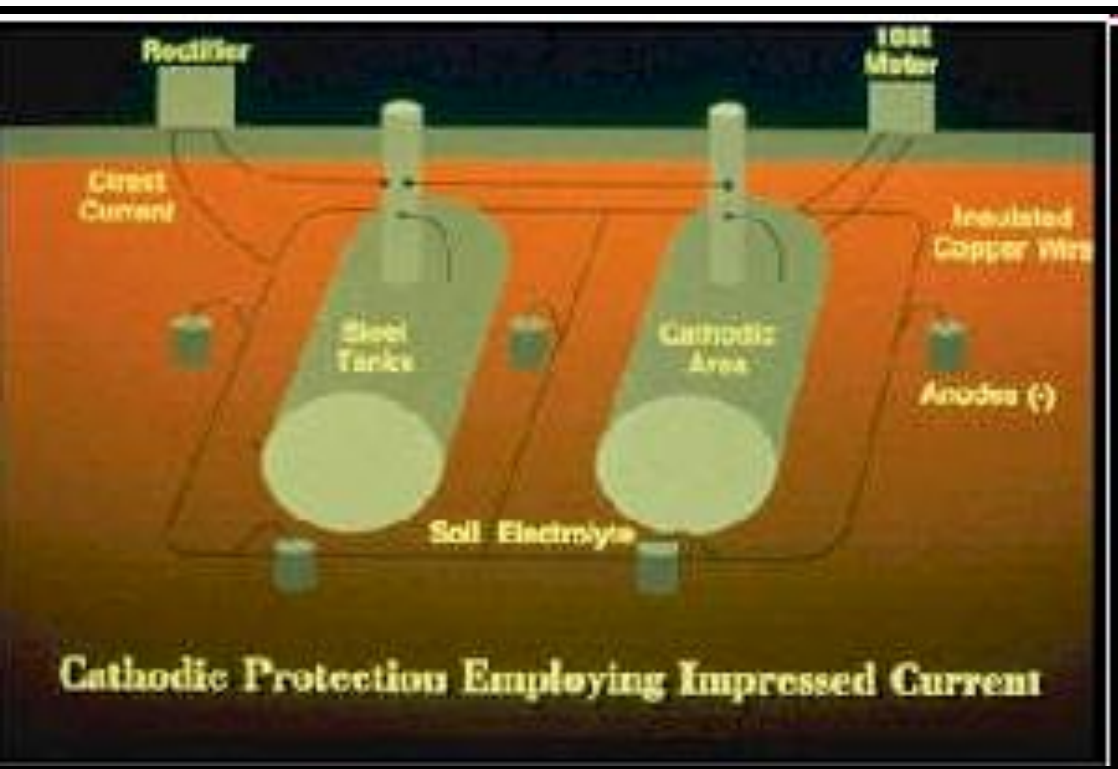
Tank Corrosion Protection	Tank Leak Detection	Piping Corrosion Protection			Piping Leak Detection – (circle one)		
		2	3	4	Suction / Pressurized / Both		
Method	Method	Tank end Method	Main Run Method	Dispenser end Method	Suction Method (circle one)  European  American/ Standard	Pressurized Method (circle one)  ELLD  MLLD	Pressurized Method (circle one)  LTT SIR ELLD IM
Sacrificial Anodes p. 14							
Testing Frequency	Testing Frequency	Testing Frequency	Testing Frequency	Testing Frequency	Testing Frequency	Testing Frequency	Testing Frequency
3 yrs							
Documentation	Documentation	Documentation	Documentation	Documentation	Documentation	Documentation	Documentation
7A							
Next date	Next date	Next date	Next date	Next date	Next date	Next date	Next date
---	---	---/---/---	---	---	---	---	---

# Impressed Current

Where  
piping  
connects  
to tank  
(2)

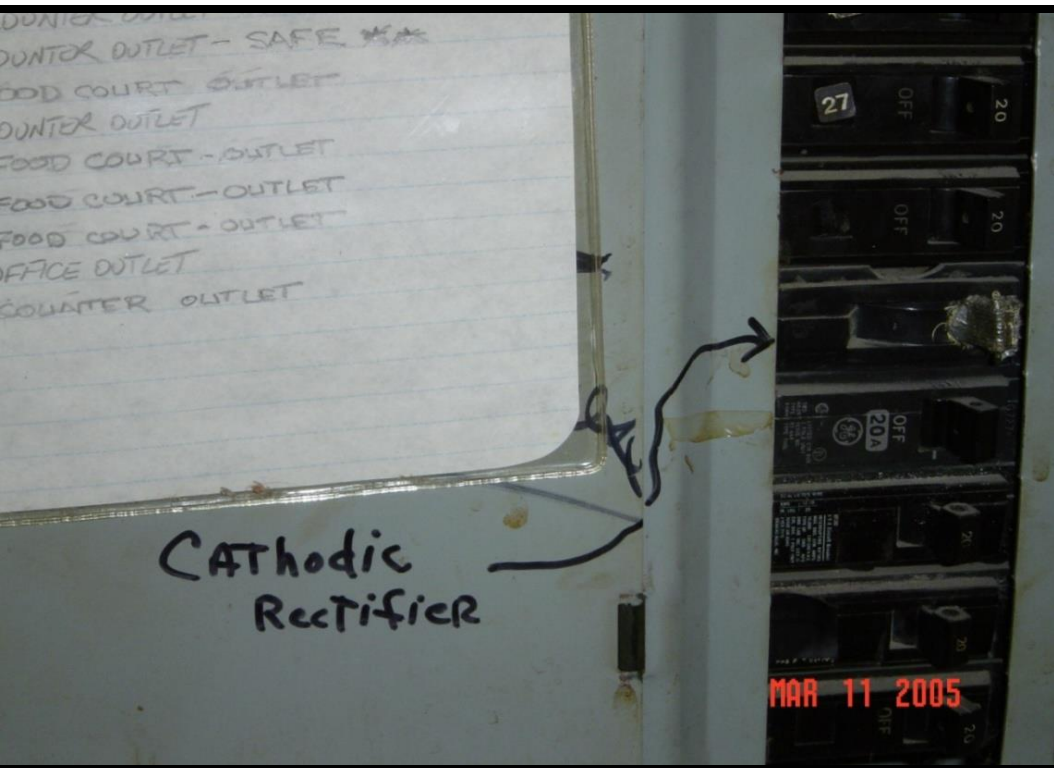


# IMPRESSED CURRENT



- ▶ Anodes located in soil around structures to be protected
- ▶ Electrical current is applied to anodes

# Impressed Current:



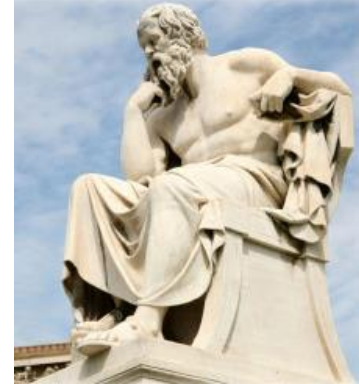
- Requires **dedicated** and **protected** circuit
- **Power** must not be interrupted (except during testing)
- **Breaks in wiring** result in system failure

# Impressed Current Requirements:





- Operator must *inspect system* every 60 days
- Reading can NOT be ZERO
- Reading can NOT change by more than 20%
- Make sure meter never loses power





# Impressed Current Records

- Test IC system every 3 years
- Hire a qualified CP tester
- Report results on **UST-7B** form

 **UST-7B** NORTH CAROLINA CATHODIC PROTECTION SYSTEM  
EVALUATION FOR IMPRESSED CURRENT SYSTEMS 

➤ This form must be utilized to evaluate underground storage tank (UST) cathodic protection systems in the State of North Carolina.  
➤ A copy of this completed form must be submitted by the owner /operator to the NCDENR UST Section, at the address listed below, within 30 days of testing.  
➤ Access to the soil directly over the cathodically protected structure that is being evaluated must be provided.  
➤ A site drawing depicting the UST cathodic protection system and all reference electrode placements must be completed.

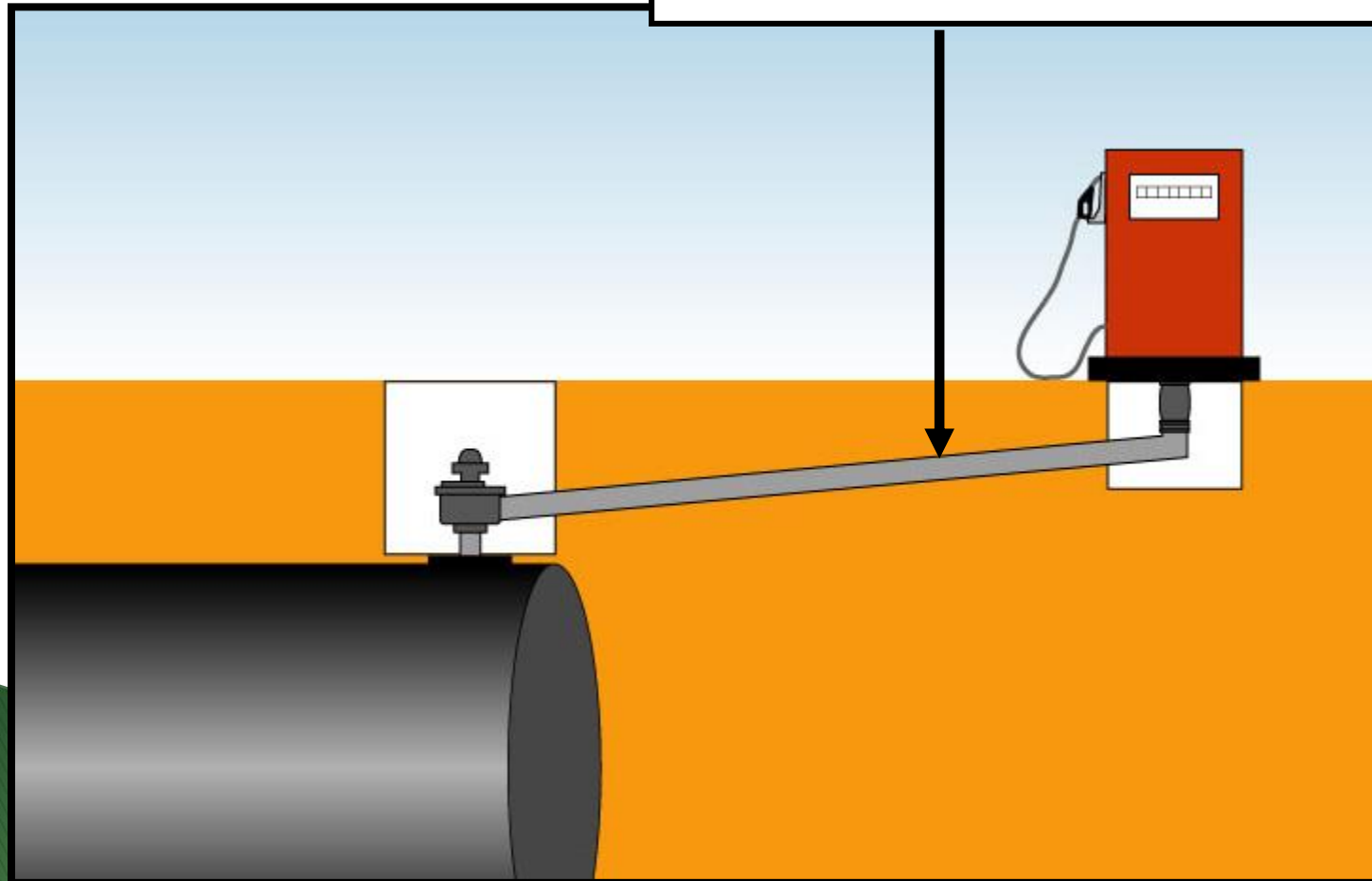
I. UST OWNER		II. UST FACILITY	
Name:		Name:	Facility ID:
Address:		Address:	

# Piping Corrosion Protection

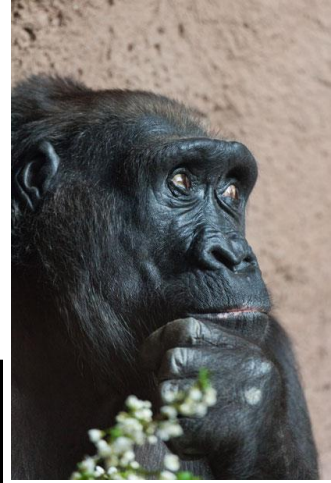
Tank Corrosion Protection	Tank Leak Detection	Piping Corrosion Protection			Piping Leak Detection – (circle one)		
		2	3	4	Suction / Pressurized / Both		
		Tank end	Main Run	Dispenser end	Suction	Pressurized	Pressurized
Method	Method	Method	Method	Method	Method (circle one)	Method (circle one)	Method (circle one)
		<p><b>Impressed Current</b></p> <p><b>p. 14</b></p>			<p>European</p> <p>American/Standard</p>	<p>ELLD</p> <p>MLLD</p>	<p>LTT</p> <p>SIR</p> <p>ELLD</p> <p>IM</p>
Testing Frequency	Testing Frequency	Testing Frequency	Testing Frequency	Testing Frequency	Testing Frequency	Testing Frequency	Testing Frequency
		<p><b>60 days</b></p> <p><b>3 yrs</b></p>					
Documentation	Documentation	Documentation	Documentation	Documentation	Documentation	Documentation	Documentation
		<p><b>Rectifier Reading</b></p> <p><b>7B</b></p> <p>---/---/---</p>					
Next date	Next date	Next date	Next date	Next date	Next date	Next date	Next date
		---/---/---					

# Piping Corrosion Protection

**Main run of piping (3)**



# Non-corrodible Materials



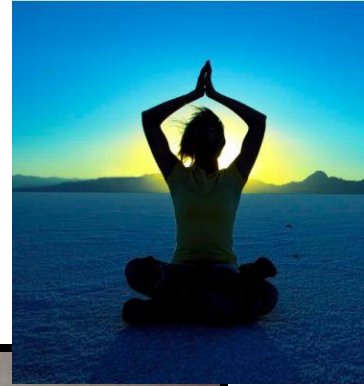
- ▶ **FRP**  
(Fiberglass Reinforced Plastic)
- ▶ **DW FRP**  
(Double-Walled FRP)





# Non-corrodible Materials:

- ▶ **FLEX**
- ▶ **DW Flex**  
(double  
wall flex)







**FRP  
Pipe**

# Non-corrodible Materials:

- ▶ **Written verification of piping material**
  - Installation invoice
  - Repair invoice
- ▶ **Visual verification**

# Piping Corrosion Protection

Tank Corrosion Protection	Tank Leak Detection	Piping Corrosion Protection			Piping Leak Detection – (circle one)		
		2	3	4	Suction / Pressurized / Both		
		Tank end	Main Run	Dispenser end	Suction	Pressurized	Pressurized
Method	Method	Method	Method	Method	Method (circle one)	Method (circle one)	Method (circle one)
			FRP / Flex		European	ELLD	LTT
			p. 14		American/ Standard	MLLD	SIR ELLD IM
Testing Frequency	Testing Frequency	Testing Frequency	Testing Frequency	Testing Frequency	Testing Frequency	Testing Frequency	Testing Frequency
			N/A				
Documentation	Documentation	Documentation	Documentation	Documentation	Documentation	Documentation	Documentation
			Visual/ Invoice/ Repair or Installation				
Next date	Next date	Next date	Next date	Next date	Next date	Next date	Next date
			N/A				

# Piping Corrosion Protection

Tank Corrosion Protection	Tank Leak Detection	Piping Corrosion Protection			Piping Leak Detection – (circle one)		
		2 Tank end	3 Main Run	4 Dispenser end	Suction	Pressurized	Pressurized
Method	Method	Method	Method	Method	Method (circle one) European American/ Standard	Method (circle one) ELLD MLLD	Method (circle one) LTT SIR ELLD IM
Testing Frequency	Testing Frequency	Testing Frequency	Testing Frequency	Testing Frequency	Testing Frequency	Testing Frequency	Testing Frequency
Documentation	Documentation	Documentation	Documentation	Documentation	Documentation	Documentation	Documentation
Next date	Next date	Next date	Next date	Next date	Next date	Next date	Next date

**Impressed  
Current  
p. 14**

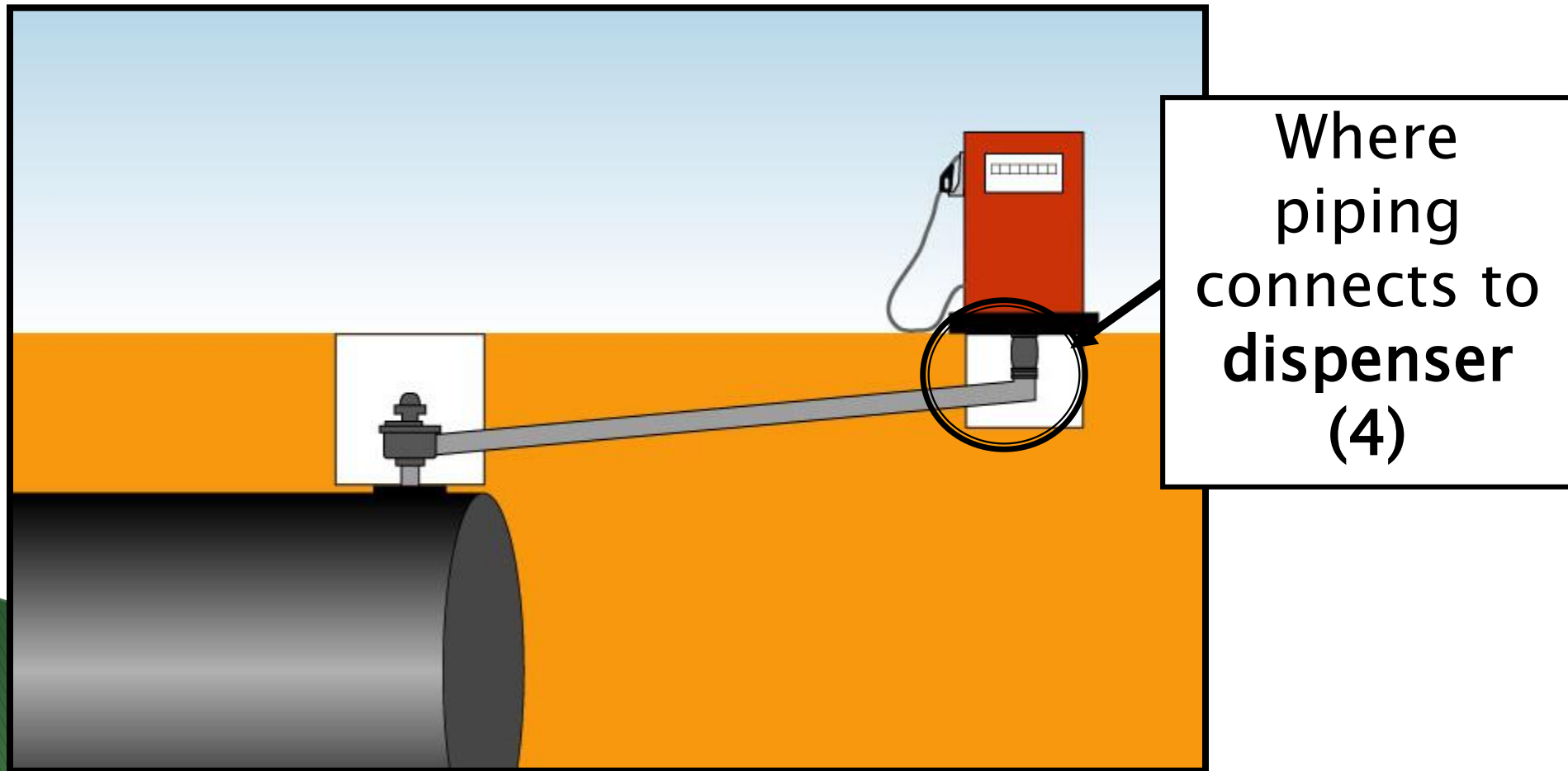
**60 days  
3 yrs**

**Rectifier  
Reading  
7B**

---/---/---

---/---/---

# Piping Corrosion Protection





# Piping Corrosion Protection

Tank Corrosion Protection	Tank Leak Detection	Piping Corrosion Protection			Piping Leak Detection – (circle one)		
		2	3	4	Suction / Pressurized / Both		
Method	Method	Tank end Method	Main Run Method	Dispenser end Method	Suction Method (circle one)  European American/ Standard	Pressurized Method (circle one)  ELLD MLLD	Pressurized Method (circle one)  LTT SIR ELLD IM
Testing Frequency	Testing Frequency	Testing Frequency	Testing Frequency	Testing Frequency	Testing Frequency	Testing Frequency	Testing Frequency
Documentation	Documentation	Documentation	Documentation	Documentation	Documentation	Documentation	Documentation
Next date	Next date	Next date	Next date	Next date	Next date	Next date	Next date

Same options as #1

# Problems with Corrosion Protection

- ▶ **Inoperative** corrosion protection systems
- ▶ **Failed** corrosion protection systems /or not providing adequate protection
  - Specific requirements for each situation:
    - [tankschool/.ncdenr.gov](http://tankschool/.ncdenr.gov)
      - “Guidance Documents”
      - “Corrosion Protection”

# Exam

- ▶ Please answer questions #10 – 17
- ▶ LUNCH